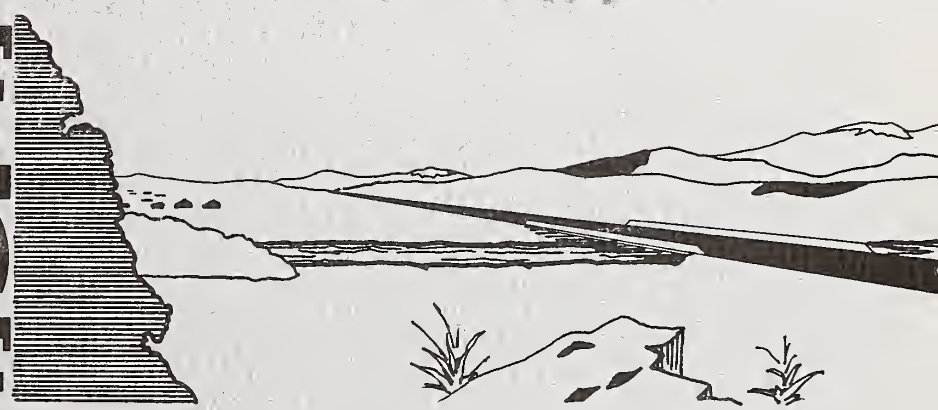
FHWA-MT-EIS-80-01-D

GREAT FALLS SOUTH ARTERIAL
PROJECT M5212(1)
GREAT FALLS, MONTANA

DRAFT ENVIRONMENTAL IMPACT/4(f) STATEMENT



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
AND
MONTANA DEPARTMENT OF HIGHWAYS
IN COOPERATION WITH
DEPARTMENT OF THE ARMY
OMAHA DISTRICT CORPS OF ENGINEERS

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U.S. Department of Transportation
Federal Highway Administration
and
Montana Department of Highways

in cooperation with
Department of the Army
Omaha District Corps of Engineers

Submitted pursuant to 42 U.S.C. 4332(2)(c), 23 U.S.C. 128(a), 49 U.S.C. 1653(f), and 16 U.S.C. 470(f).

1-23-80
Date

for MDOH

1-23-80
Date

for FHWA

ABSTRACT

The Update of the Urban Transportation Plan for Great Falls and the Great Falls Area Comprehensive Plan indicate that an expanded highway system will be required to handle the east/west traffic in the southern part of Great Falls. The alternatives of no action, expanded mass transit, upgrading existing streets, and the south arterial are reviewed in this Draft EIS.

The "no action" alternative would eliminate construction costs and impacts on the environment, however, it would not decrease traffic congestion or certain social costs. The "mass transit" alternative would have the lowest environmental impact, but would be difficult to implement due to cultural factors and spatial relationships. "Upgrading existing streets" would have minimal impacts on the biophysical environment, but would not provide a transportation system to handle long term traffic needs. The south arterial would decrease congestion on existing streets, provide transportation for the growing south Great Falls area, and provide a route for through traffic. However, it would have the greatest impact on the rural environment. All proposed routes for the south arterial would cross the Lewis & Clark Portage, a National Landmark; impact wetlands; and cross designated flood plains.

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Comments on the Draft EIS are due by April 18, 1980 and should be sent to Mr. Kologi at the above address.

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SUMMARY

Purpose and Need

The Great Falls Transportation Plan has identified a need for transportation system improvements which will:

- alleviate traffic congestion on 10th Avenue South;
- answer the need for a major transportation arterial within the South Great Falls area; and
- provide an alternative route to 10th Avenue South for through traffic to bypass Great Falls.

The existing 10th Avenue South facility will not be able to handle the projected increased traffic loads in the year 2000 even if substantial upgrading is implemented. Early definition of a south arterial route will also enhance planning for orderly growth of the South Great Falls area.

The Proposed Action

The proposed action is the construction of a controlled access four-lane facility, to be located south of 10th Avenue South. It would extend from the Gore Hill Interchange of Interstate 15 to the intersection of 10th Avenue South and 57th Street, seven and one half miles to the east. The project area is directly south of Great Falls, Montana in Cascade County which is located in the north central area of the state. Major intermediate features include two railroad crossings, the Missouri River crossing, the descent of the Sun River Bench and five major access interchanges. The project length varies between 8.37 and 9.06 miles, depending on the particular alignment finally selected.

The Army Corps of Engineers, the Montana Department of Health and Environmental Sciences (DHES), and the Montana Historic Preservation Office have advised that permits required for project implementation are:

- Corps of Engineers 404 permit for crossing the Missouri River floodplain and/or the Sand Coulee Creek floodplain;
- DHES Section 6(g) Authorization allowing temporary increase in water turbidity;
- DHES wastewater discharge permit; and
- Historic Preservation Act, Section 106 clearance.

Alternatives Considered

Several alternatives were proposed and considered in relation to their ability to meet the identified transportation needs. Most were downgraded as reasonable alternatives after studies,revealed they did not answer all of the recognized needs. The major alternatives included:

- Upgrade 10th Avenue South;
- Conversion of 10th Avenue South to a one-way system;
- Implementation of a high level of mass transit;
- Carpooling and voluntary travel reductions;
- The proposed action (several alternative south arterial alignments);
- Three reduced facility alternatives; and
- No action.

In addition several design options for a south arterial facility were considered, including staged construction and a lesser degree of access control.

Significant Impacts

Significant adverse impacts identified during the environmental assessment include:

- The crossing of the Lewis and Clark Portage route (a National Historic Landmark);
- Impact to three wetlands areas;
- Potential impact to two designated park sites;
- Impact to an undeveloped designated school site;
- Increased noise levels;
- Necessary residential and commercial relocations; and
- Visual impacts.

Significant beneficial impacts include:

- Decreased 10th Avenue South congestion;
- Improved access to the south Great Falls urban area;
- Provision of a facility for through traffic wishing to bypass the city;
- Early designation of a facility corridor;
- Enhancing area planning programs; and
- Improved air quality on 10th Avenue South.

Controversial Impacts

Controversial impacts include the parkland impacts, the Lewis and Clark Portage impact, the wetlands impacts, resident objections to a major roadway bisecting the area, and objections by those facing relocation.

CHAPTER 1 - PURPOSE AND NEED

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Great Falls is an urban area of approximately 80,000 people in the northwestern portion of Montana's Great Plains. It is a trade and service center for an area of roughly 25,000 square miles serving a regional population of approximately 220,000 people. Its general location is shown on Figure 1-1.

The transportation system serving Great Falls includes an international airport with scheduled passenger service, transcontinental bus lines, railroads, and federal and state highways. There are 16 air and 20 bus arrivals and departures daily. While there is no passenger rail service the Burlington Northern and Milwaukee Railroads provide freight hauling. Highways (Figure 1-2) passing through Great Falls include I-15, a north-south branch of the Interstate system, U.S. Highways 87 and 89, and several state highways.

The term "south arterial" indicates this study is concerned with the transportation needs in and around the southern portion of Great Falls. The specific area is south of the central business district and between Great Falls International Airport on the west and Malmstrom Air Force Base on the east, as shown on Figure 1-3.

NEED

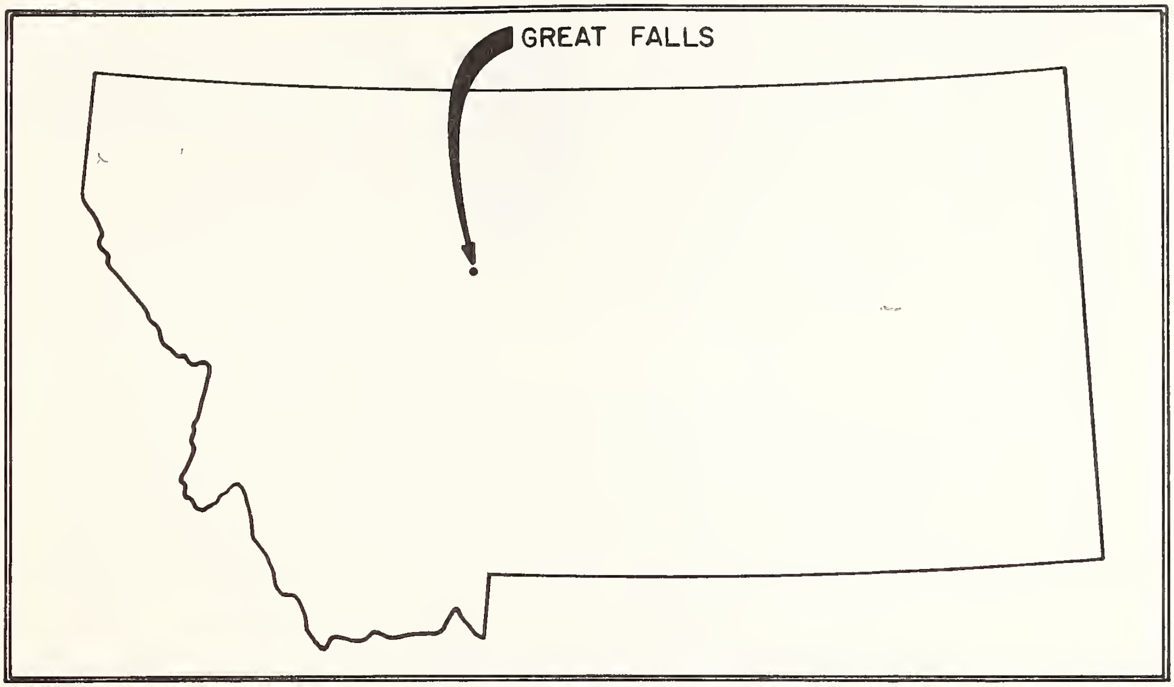
The need for a "south arterial" was first described in the "Great Falls Transportation Plan, 1968 Update". The rationale for the proposed project has been modified and refined during the intervening ten years but can be summarized as:

- Need for a reduction in the congestion on 10th Avenue South;
- Need to provide an arterial route to improve access for future development in the south Great Falls urban area; and
- Need for an alternative route for through traffic.

Integral to the orderly growth of the Great Falls urban area is the need to plan for transportation systems prior to the development of an area. The Great Falls south arterial study will partially address this planning need. Although construction of the south arterial, if selected as the best alternative, may not be effected until the early 1990's, the delineation of right-of-way will assist local planners, developers, and residents in planning their future activities. The early acquisition of right-of-way minimizes the impact to residential and commercial properties which could arise in the intervening years.

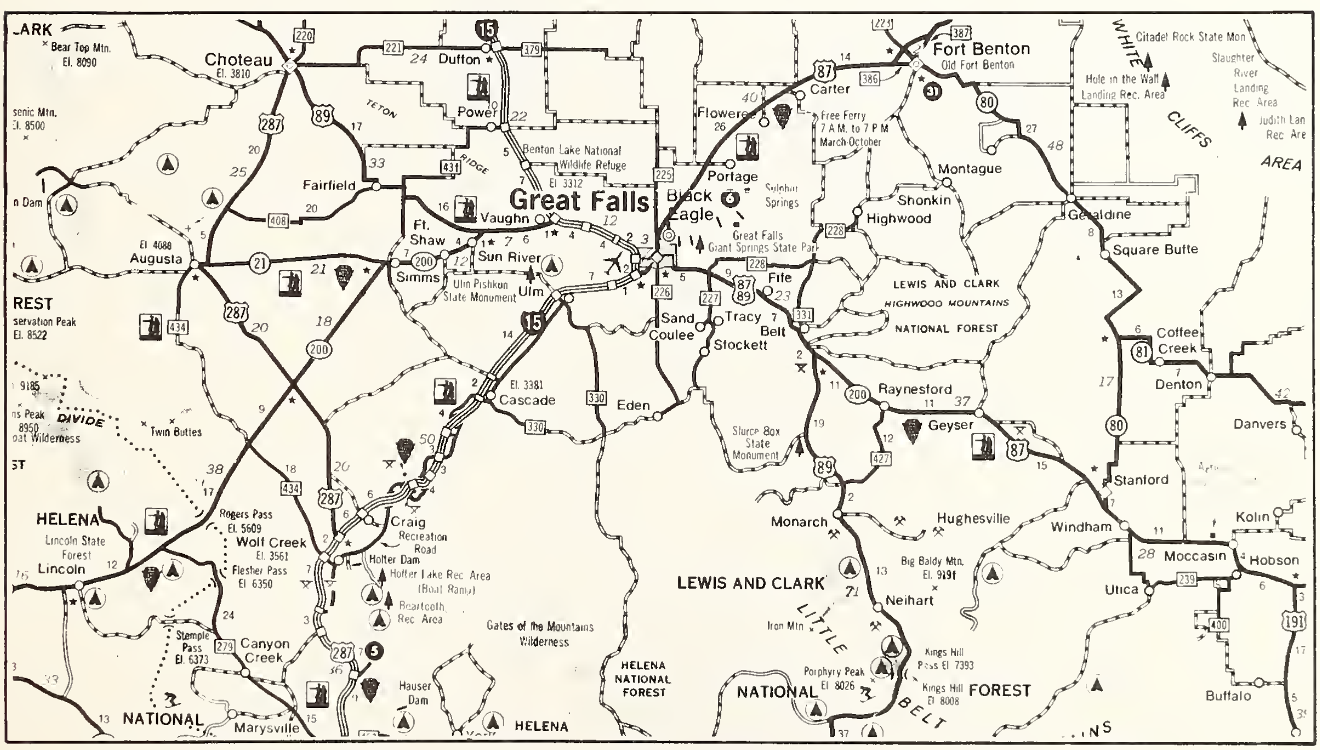
SUMMARY OF PRIOR PLANS

The "Great Falls Transportation Plan, 1968 Update" addressed the need for a "south by-pass" facility to transfer a portion of the 10th Avenue South traffic load. It also provided a generalized location plan for a



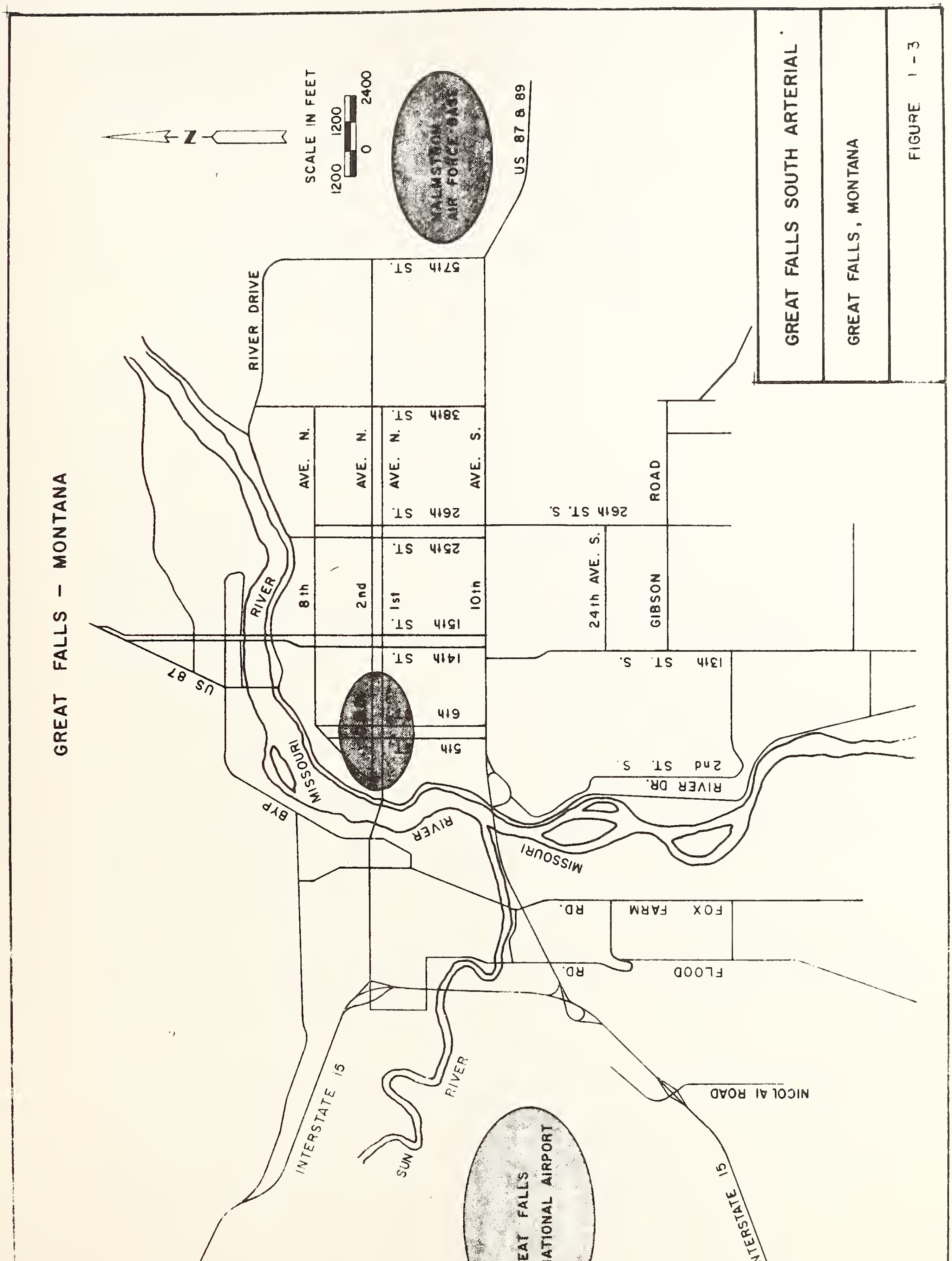
General Location Map

Figure 1-1



Highways Serving Great Falls

Figure 1-2



GREAT FALLS SOUTH ARTERIAL

GREAT FALLS, MONTANA

FIGURE 1 - 3

conceptualized by-pass facility. A rudimentary time-table recommended the following construction dates for the primary facility and associated projects (this schedule has not been adhered to):

- 1970-75. Expand the Warden Bridge to four lanes. (This is currently projected for 1980);
- 1970-75. Upgrade 10th Avenue South to six lanes. (This is currently projected for 1980-1990);
- 1980-85. Construct the first two lanes of the south by-pass, from Fox Farm Road to 26th Street South; and
- 1985-90. Complete the by-pass to four lanes from the airport interchange to 57th Street.

The "Great Falls Area Comprehensive Plan, 1970" reinforced the conclusions of the transportation plan.

The "Transit Feasibility Study" completed in 1976 indicated that the benefits of mass transit would primarily be directed toward the central business district.

The "Great Falls, Montana, Tenth Avenue South Improvement Plan 1979", contains substantial relevant data which is referenced in the following section. This report concludes, "Considering the deteriorated state of the existing pavement and the near-capacity traffic flow on 10th Avenue South, combined with the fact that a six-lane facility would be able to adequately handle traffic to the year 2000, it is our conclusion that improving 10th Avenue South to a six-lane facility is of more immediate benefit than the south arterial. Of course, right-of-way and construction plans for the south arterial should proceed since it would be required after the year 2000 even if 10th Avenue South is expanded to a six-lane facility".

The "Great Falls Transportation Plan, 1979" parallels the 1968 transportation plan update regarding the south arterial. Terminology change indicates a greater emphasis on local traffic (south arterial) rather than through traffic (south by-pass).

SUPPORTIVE INFORMATION

Information from several sources supports the need for an expanded highway system in the south Great Falls urban area.

Projections By The Montana Department Of Highways

The Montana Department of Highways has developed a computer model of the Great Falls street network using Origin and Destination Studies conducted for the 1968 Transportation Plan and updated socio-economic projections. Year 2000 traffic projections indicate that without a new southern route, 10th Avenue South would be carrying up to 44,690 vehicles per day, 50.2% more than in 1978. Traffic projections are presented on Figures 2-5 through 2-11.

Accidents on 10th Avenue South

During 1976 and 1977 there were 1,065 accidents on 10th Avenue South, including one fatality and 97 injuries. The accident rate for the western half of the road (Warden Bridge to 28th Street South) was over four times that for the eastern half - 19 accidents per million vehicle miles as opposed to 4 accidents per million vehicle miles. This appears to be due to a combination of higher traffic volumes, inadequate pavement, median traffic lighting structures, more driveway approaches, and more traffic signals. Intersections with traffic signals accounted for eleven of the twelve high accident rate locations.

10th Avenue South Congestion

The primary need for a south arterial arose from the congestion of 10th Avenue South. This four-lane arterial consists of a 16-foot median with left turn bays, four 11-foot driving lanes and two 10-foot emergency parking lanes for a total roadway width of 80 feet. The lack of access control on this route has resulted in numerous access connections from both north-south intersecting streets and from the strip commercial development along the roadway corridor. There are 13 signalized intersections between 2nd Street South and 49th Street South.

10th Avenue South has a variable traffic capacity of between 1250 and 1750 vehicles per hour in each direction. The capacity is controlled by intersection geometry, vehicle turning movements, pavement width, signalization, and access to abutting property. The westbound traffic lanes operate at very near capacity while the eastbound lanes occasionally exceed capacity.

The average travel speed and stopped time for driving the section of 10th Avenue South between Warden Bridge and 57th Street are shown in Table 1-1.

Table 1-1
AVERAGE TRAVEL SPEEDS AND STOPPED TIME FROM
WARDEN BRIDGE TO 57th STREET

Direction of Travel	Average Running Speed (MPH)	Average Travel Speed (MPH)	Average Stopped Time (Sec.)
Eastbound			
Peak..........	29.7	26.0	75
Off-Peak......	32.6	30.0	29
Westbound			
Peak..........	29.3	25.8	69
Off-Peak......	31.9	29.3	44

Source: 10th Avenue South Improvement Plan, 1979

Condition of Existing Facilities

Two serious inadequacies plague 10th Avenue South. The deteriorated pavement condition of the west section of the avenue and the Warden Bridge bottleneck constrict traffic movement. Both conditions are recognized and have been addressed in future traffic planning.

The Warden Bridge is tentatively scheduled for expansion to four lanes in 1980. The "10th Avenue South Improvement Plan, 1979", suggesting paving and widening of 10th Avenue South, includes the following recommendations:

- The pavement from Warden Bridge to 17th Street South will require complete replacement;
- The pavement from 17th Street South to 28th Street South is inadequate, but partly salvageable; and
- The pavement from 28th Street South to 57th Street may be useable for five to ten more years.

SYSTEM LINKAGE

The Missouri River separates east and west Great Falls. Presently the most southerly of the four river crossings is the Warden Bridge on 10th Avenue South. An arterial within the corridor under study would provide an east-west link for the north-south arterial streets south of 10th Avenue South and would provide an alternative to 10th Avenue South for those people who wish to travel across the south side of the city.

The south arterial would be designed as a controlled access facility. The transfer of traffic from 10th Avenue South to the south arterial would result in a reduction of travel time and delay for motorists with corresponding reduction in energy consumed per vehicle mile traveled.

A common transportation system planning "rule of thumb" is to space arterial routes at approximately one mile intervals. Existing development south of 10th Avenue South and the expense incurred in crossing the Missouri River make this "rule of thumb" standard impractical for the proposed project. However, this exemplifies the need for an east-west arterial route south of 10th Avenue South.

LINKAGE WITH OTHER MODES OF TRANSPORTATION

The construction of the south arterial and/or the upgrading of 10th Avenue South would facilitate access to the Great Falls International Airport. The south arterial would also provide an uncongested link between Malmstrom Air Force Base and the commercial airport.

SOCIAL AND ECONOMIC FACTORS

Socioeconomic projections prepared by the Great Falls City-County Planning Board, 1976, substantiate a need for the south arterial by virtue of projections of increased population and numbers of dwelling units, automobiles, and area employees. All of these factors will impact the existing transportation system and can be seen as indicators of a need for a new system element to improve traffic flows and area accessibility.

CHAPTER 2 - ALTERNATIVES

CHAPTER 2 - ALTERNATIVES

INTRODUCTION

This EIS represents one element of a process which examines the environmental effects of the reasonable alternatives which meet the identified transportation needs. This statement was prepared using an interactive process - the alternatives were modified, the depth of supportive investigations changed, and the detail to which the more reasonable alternatives were studied varied as the investigation proceeded and comments were received from the public and other agencies.

No commitment has been made to a specific alternative, but those alternatives which appeared to meet the transportation needs of the area with the least impact were treated in greater detail as the investigation progressed. As an example, time consuming and/or expensive studies such as noise impact calculations and energy use calculations were only done for the alternatives that the interactive planning/EIS process indicated would be reasonable.

This section discusses the selection process used in arriving at reasonable alternatives which would best meet the transportation needs presented in the previous section. The reasonable alternatives and various design options are then discussed in detail. All of these alternatives are under consideration and a decision will be made only after the public hearing transcript and draft EIS comments have been reviewed and evaluated.

SELECTION OF REASONABLE ALTERNATIVES

Discussion

The evaluation of alternatives for consideration began with the definition of a need for transportation system improvements as first identified in the 1968 Great Falls Transportation Plan Update. Any and all alternatives considered were proposed as solutions to meet the perceived transportation needs of the South Great Falls area.

The alternatives can be generally described as alternatives to a south arterial, alternatives for a south arterial facility, and the consequences of no action. The evaluation of an alternative was based primarily upon its ability to meet the transportation needs. Those alternates meeting this criteria were further evaluated on the basis of environmental, physical, cultural, and land use planning considerations to determine those which are reasonable.

The first step of this planning study was to review previous studies and alternatives considered to date. Available baseline engineering and environmental data were collected and initial study alignment proposals for a south arterial were developed. On March 22, 1979, these initial alignment proposals were circulated to affected agencies for comment. They were also presented at a public information/scoping meeting in Great Falls on April 5, 1979.

Public input suggested that additional route concepts be considered. Additional study alignments were developed based on the comments received. The array of alternatives to a south arterial was also expanded and considered. Those alternatives which appeared reasonable were then studied in greater detail. All of the alternatives were presented at a second public information/scoping meeting in Great Falls on August 21, 1979. Comments received were considered in the further refinement and evaluation of the reasonable alternatives. All alternatives considered to date are discussed below. A matrix summary of the alternatives is presented following the discussion.

Alternatives to South Arterial

Upgrade 10th Avenue South. The upgrading of 10th Avenue South east of the Warden Bridge from its present four lanes to six lanes was a recommendation of both the 1968 Great Falls Transportation Plan Update and the 10th Avenue South Improvement Plan, 1979. This alternative would temporarily reduce congestion on 10th Avenue South. By the year 2000, however, traffic volumes would again be approaching the capacity of this roadway. This alternative does not meet the other transportation needs.

For these reasons, the upgrading of 10th Avenue South can only be considered a temporary, or short term, alternative to a south arterial facility. Also, it would not assist in long term land use planning for the South Great Falls urban area as a right-of-way for a south arterial would not be determined or acquired.

The upgrading of 10th Avenue South would be an effective action to complement a south arterial alternative as it would temporarily reduce congestion on this route to permit phased construction of a south arterial.

Conversion of 10th Avenue South to a One-Way System. This alternative would involve the development of a one-way couplet utilizing 10th Avenue South and a parallel route to the north or south. To be effective here, the streets of a couplet should be no more than one block apart. This alternative would be difficult to implement because of the difficulty in obtaining right-of-way for the complimentary one-way street. A parallel road to the south would involve going through or around a hospital, a college, a major shopping center, and developed residential areas. A north parallel route would go through a heavily developed residential area, including two parks.

This alternative meets only one of the transportation needs, that of easing congestion on 10th Avenue South. It also would not meet the secondary need to plan for transportation systems prior to development in the area south of 10th Avenue South.

Implementation of a High Level of Mass Transit. Although this alternative offers distinct economic and environmental advantages, it does not provide the needed transportation system for south Great Falls and does not provide an alternative route for through traffic. Cultural factors and spatial relationships would prevent the concept from having substantial impact on the transportation needs of the south Great Falls urban

area. Mass transit would not meet the secondary need for land use planning in this area of the community. The "Transit Feasibility Study", conducted in 1976, provides information on several types of mass transit systems.

Use of Carpools and Voluntary Travel Reductions. The use of carpools and/or voluntary travel reductions is another alternative with economic and environmental advantages but would reduce congestion on 10th Avenue South only if used intensively and would not meet the other transportation needs. Increased cost of personal transportation may result in increased use of carpools in the future. Spatially however, this alternative would not fit the needs of suburban residents. The Montana Department of Highways projects a steady growth in automobile use within the project area.

Alternatives for a South Arterial Facility

Facility Corridor. The facility corridor for the alternate south arterial alignments studied to date extends from the Gore Hill Interchange on Interstate 15 on the west to the intersection of 10th Avenue South with 57th Street on the east. Proceeding east from the Gore Hill interchange, the corridor reaches a maximum width of nearly two miles at the Missouri River. It then narrows to a minimum of approximately one-half mile at 26th Street South because of the Highland Cemetery south of the corridor. East of 26th Street South the corridor again widens to nearly one and a half miles before reaching 10th Avenue South at 57th Street. The corridor alignment is shown on Figure 2-1.

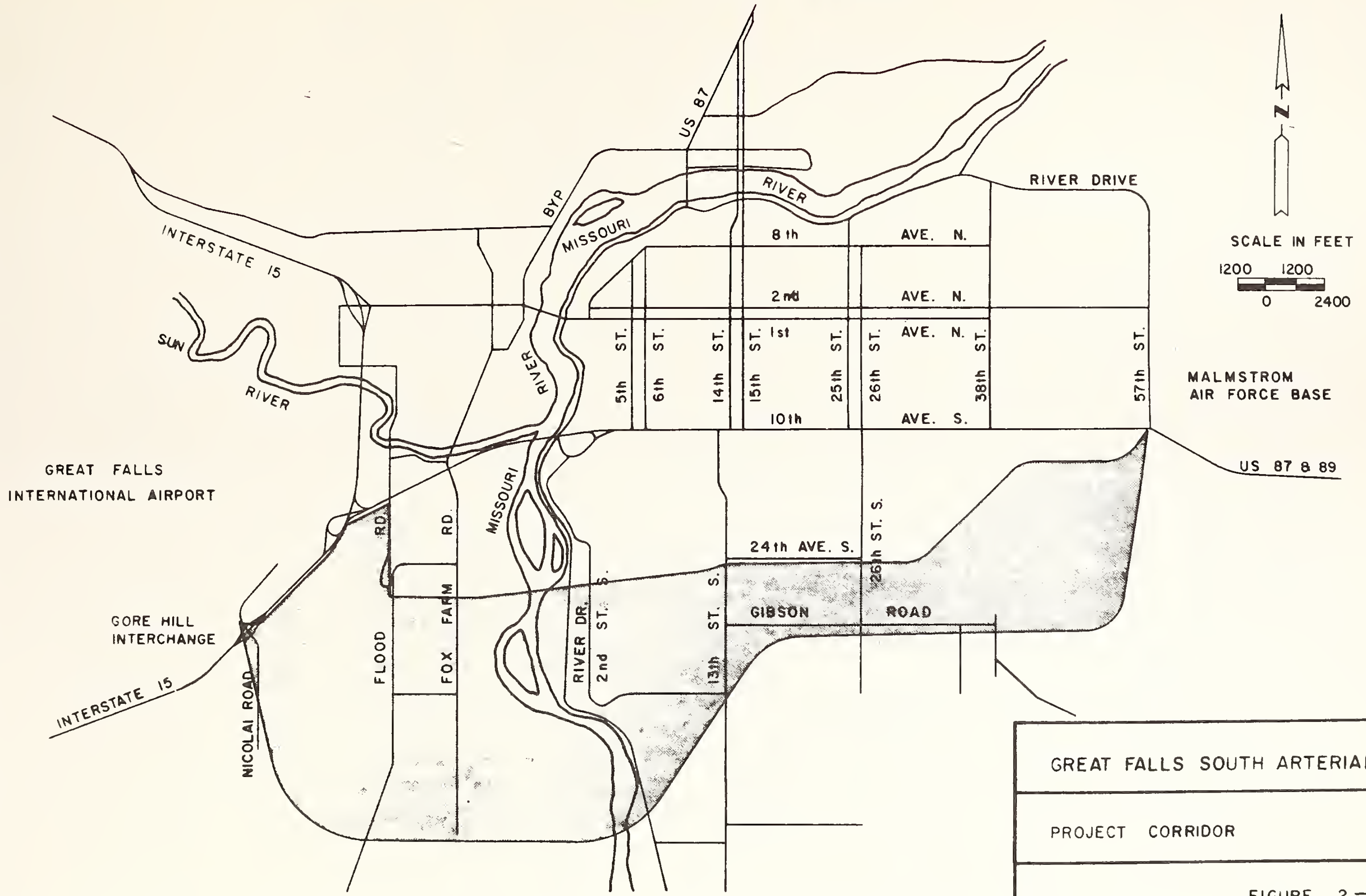
The major physical features controlling south arterial locations are:

- The two termini, which dictate a facility that can be easily interconnected;
- The Missouri River crossing location, because cost and complexity increase with bridge length;
- The descent of Gore Hill, which will require massive cuts and/or fills; and
- The crossing of Gibson Flats versus skirting the north side of the area which is in the Sand Creek Coulee floodplain.

No less than 36 alternate south arterial routes have been considered since the need was established in the 1968 Transportation Plan. Most of these were studied prior to the initiation of this EIS/planning study, and subsequent development has made many of the route alternates impractical.

Planning Study Alignments. With the initiation of this planning study all of the previously considered alignments were reviewed. Additional alignments were then studied as discussed earlier. Based upon evaluation of traffic projections and the types and locations of access facilities, it was determined that a south arterial should be designed as a four lane, divided roadway with full access control. Access should be limited to major street connections. Planning for the total facility should include interchanges at all access locations where feasible to provide adequate capacity for needs beyond the year 2000. All of the full facility alternates would have the option of phased construction versus initial full construction.

GREAT FALLS - MONTANA



GREAT FALLS SOUTH ARTERIAL

PROJECT CORRIDOR

FIGURE 2-1

The alternate south arterial alignments can best be discussed under several conceptual alignment descriptions. The conceptual alignments are described using the route termini and the approximate location of the Missouri River crossing. The alternate alignments considered in this planning study are shown on Figure 2-2.

Airport - Bridge Between Park and Taylor Islands - 57th Street. A south arterial alignment crossing the Missouri River between Park and Taylor Islands would meet all of the transportation needs as identified and would have the advantage of a narrow river crossing. Such an alignment would cross heavily developed areas on both sides of the Missouri River. Due to the obvious personal impacts of this conceptual alignment and the availability of suitable alignments further south, this alignment was downgraded as a reasonable alternative. No formal alignments for this route concept were proposed.

Airport - Bridge South of Taylor Island - 57th Street. This generalized route initially appeared to be the most attractive. In addition to meeting the transportation needs, it offers the advantages of a narrow river crossing and minimizing adverse impacts.

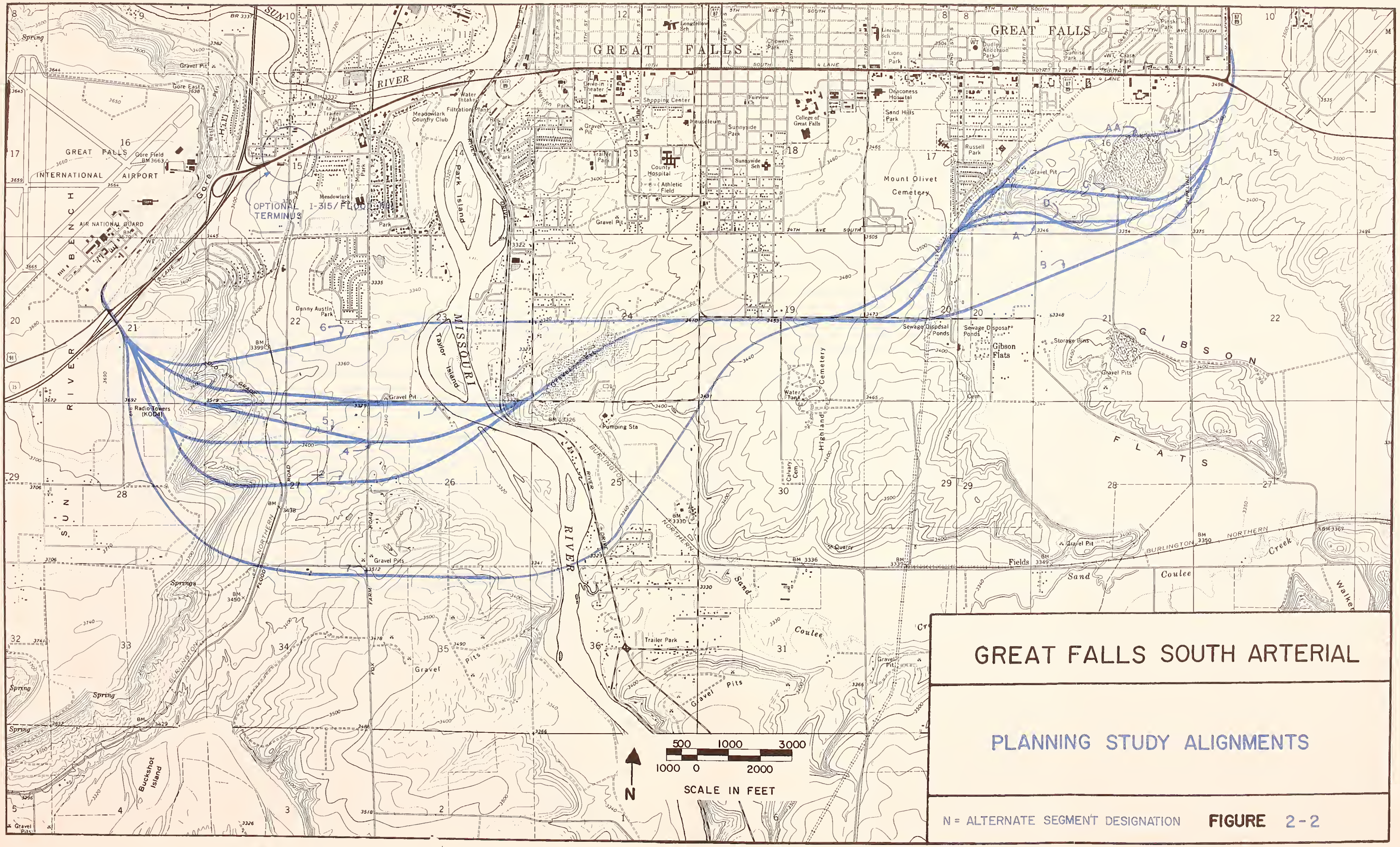
Two formal route alignments were initially proposed in the western half of the project corridor utilizing this general River crossing location. These are designated as Alternates 1 and 2 on Figure 2-2. Alternates 1 and 2 join at 2nd Street South and diverge again near 26th Street South.

From this point east, two routes were initially considered, designated on Figure 2-2 as "AA" and "B". Alternate "AA" would avoid the Gibson Flats flood plain but was downgraded as a reasonable alternate because it was too close to 10th Avenue South, would cross too much prime commercial development property, would impact too much residential development in this area, and would not provide a good alignment for possible future extension of the south arterial to the east. No formal proposal was made for this alignment. In lieu of this alignment, alternate "A" was proposed which would cross only the northern tip of the Gibson Flats flood plain. Alternate "B" crosses the Gibson Flats flood plain but provides a more direct route.

As a result of public and agency input, three additional alignments were considered in the western half of the project corridor which crossed the Missouri River south of Taylor Island. These are identified as alternates 3, 4, and 5 on Figure 2-2. These alternates offer optional routes to descend Gore Hill. Alternates 4 and 5 follow an alignment midway between the original proposals west of the Missouri River.

Two additional alignments were considered in the eastern half of the project corridor. These are identified as alternates "C" and "D" on Figure 2-2., and are basically modifications of alternate "A".

Airport - Bridge at Taylor Island - 57th Street. This alternative, identified as alternate 6 on Figure 2-2, is the most direct route of those considered west of 26th Street South. It can be combined with any of the alternate routes east of 26th Street South as discussed above. Traffic projections indicate that it would be the most efficient of the alternatives relative to meeting the transportation needs. However, this alternative would cross officially designated parkland and a proposed school site. It would also impact more existing residential development than an alternate further south.



GREAT FALLS SOUTH ARTERIAL

PLANNING STUDY ALIGNMENTS

N = ALTERNATE SEGMENT DESIGNATION

FIGURE 2-2

Airport Bridge North of Sand Coulee Creek - 57th Street. This conceptual alignment was originally considered and downgraded as a reasonable alternative as it was felt it is too far south to load adequately with traffic. However, some support for this alternative was voiced at public information meetings. Also, the Montana Department of Fish, Wildlife, and Parks indicated an alternate which crossed the Missouri River at this location would have the least impact on the Missouri River and associated wetlands.

Therefore, traffic projections were developed for this alignment, designated as alternate 7 on Figure 2-2. These projections confirm that this alternate does not meet the transportation needs. Many motorists would take 10th Avenue South instead of traveling the additional distance required by this alternate.

Interstate 315/Flood Road - 57th Street. This alternate would utilize an interchange at I-315 and Flood Road (14th Street Southwest) as the western terminus of the south arterial. This concept was reviewed as an alternative to the Gore Hill Interchange terminus. It could utilize any of the formally proposed routes and river crossings shown on Figure 2-2.

This concept was originally downgraded as a reasonable alternative as previous studies indicated a full interchange at I-315 and Flood Road would not be feasible due to problems related to right-of-way, geometrics, and cost. Later consideration given to a full interchange at this location by the Montana Department of Highways, however, indicated that such a concept may be feasible. Therefore, traffic projections were developed for a south arterial alignment with this western terminus.

The traffic projections indicate this alignment would not load nearly as well with traffic as an alignment with the western terminus at the Gore Hill Interchange. Similarly, traffic volumes on 10th Avenue South would be considerably higher. Also, physical conditions along the Flood Road corridor would make construction of the South Arterial in this area difficult. An existing parochial school and residential development in this area would be impacted severely by this alternate.

Reduced Facility. As an alternative to construction of a full south arterial facility, consideration was given to construction of a partial facility. In the 1979 update of the Long Range Plan of the Great Falls Transportation Plan, three alternate year 2000 transportation systems were compared to evaluate partial construction of a south arterial. The first alternate proposed the construction of the entire south arterial from the Gore Hill interchange at Interstate 15 to the intersection of 10th Avenue South and 57th Street. The second alternate proposed only partial construction from Fox Farm Road eastward to 13th Street South. The third alternate proposed partial construction from the Gore Hill Interchange to 13th Street South.

The transportation system which utilized a full facility provided significantly greater system safety and maintained higher levels of service, particularly along 10th Avenue South. The reduced facility alternates were not nearly as effective as the full facility in attracting traffic away from 10th Avenue South. On the other hand, the initial construction and maintenance costs of the partial facility alternates were far less than construction and maintenance costs for the full south arterial.

As part of this EIS/planning study, consideration was also given to a two lane facility for the full length of the corridor from the Gore Hill Interchange to the intersection of 10th Avenue South with 57th Street. This alternate would temporarily meet the transportation needs but would not provide adequate capacity for projected year 2000 traffic, particularly between Fox Farm Road and 26th Street South.

While these reduced facility alternates would not meet the long term transportation needs by themselves, they could serve as interim goal elements of a full facility under phased construction as they would meet short term transportation needs.

No Action Alternative

The existence of a "no action" alternative is common to environmental impact assessments. Inclusion of the alternative implies no activities that would resemble or become part of a south arterial facility. Further implications suggest maintenance of the existing transportation facility in its present condition except for the addition of the programmed Warden Bridge expansion. This construction would ease traffic congestion somewhat on 10th Avenue South as there would then be four lanes crossing the Missouri River rather than the present two lanes. However, this alternative would not meet the transportation needs as identified.

Summary and Evaluation of the Alternatives

Figure 2-3 summarizes information generated relative to the selection of reasonable alternatives. It provides a basis for a qualitative evaluation of conceptual route alignments and south arterial alternatives with environmental, physical and cultural considerations. These subjective evaluations do not necessarily represent actual established impacts of the alternatives.

After studying all of the alternatives, it was determined that none of the alternatives to a south arterial would meet the transportation needs. Two of the conceptual south arterial alternates appeared reasonable based on their ability to meet the transportation needs. These are the "Airport - Bridge South of Taylor Island - 57th Street" alternate and the "Airport - Bridge at Taylor Island - 57th Street" alternate.

Of the formal alignments crossing the Missouri River south of Taylor Island, alternates 4 and 5 provide the best locations for descending Gore Hill and appear to have the least adverse impacts. Therefore they were retained as reasonable alternatives. Alternate 6, which crosses the River at the north end of Taylor Island was retained as a reasonable alternative because it is the most direct route and because it loads better traffic than the other alternate routes.

East of 26th Street South, alternates B and D were retained as reasonable alternatives. Alternate B was selected as this was the most direct route in this area of the alignment corridor. Alternate D was selected as this alignment skirts the north edge of the Gibson Flats floodplain. Alternate segments B and D can be combined with any of alternate segments 4, 5, and 6 to yield six reasonable alternatives.

FIGURE 2-3
SELECTION OF REASONABLE ALTERNATIVES

A Summary Evaluation of the Alternatives

Legend:

- Favorable
- Slightly Favorable
- Neutral or Moderate
- Adverse
- Serious Adverse

CRITERIA UTILIZED / ALTERNATIVES REVIEWED	Relationship to Transportation Needs: Reduce Congestion on 10th Avenue South	Relationship to Transportation Needs: Provide Arterial Route for Southside Access	Relationship to Transportation Needs: Allow through Traffic to Bypass 10th Avenue South	Anticipate Southside Growth	Barriers to Implementation: Physical	Barriers to Implementation: Cultural	Displacement of Homes and Businesses	Generalized Environmental Impact	Impact on Recreation and Historical Sites	Cost of Construction	Selected as a Reasonable Alternative
No Action	Adverse	Adverse	Adverse	Adverse	Favorable		Favorable		Favorable	Favorable	✓
Upgrade 10th Avenue South	Favorable	Adverse	Adverse	Adverse	Favorable	Favorable	Favorable				+
Convert 10th Avenue South to a One Way System	Favorable	Adverse	Adverse	Adverse	Adverse	Adverse	Serious Adverse	Adverse	Adverse	Adverse	
High Level of Mass Transit Use	Slightly Favorable	Adverse	Adverse	Adverse	Adverse	Adverse	Favorable	Favorable			
Car Pooling & Voluntary Reduction in Travel	Slightly Favorable	Adverse	Adverse	Adverse		Adverse	Favorable	Favorable			
Airport - Bridge North of Taylor Island - 57th Street *	Favorable	Favorable	Favorable	Favorable	Adverse	Adverse	Serious Adverse	Serious Adverse	Adverse	Serious Adverse	
Airport - Bridge at Taylor Island - 57th Street *	Favorable	Favorable	Favorable	Favorable			Adverse	Adverse	Serious Adverse	Adverse	✓
Airport - Bridge South of Taylor Island - 57th Street *	Favorable	Favorable	Favorable	Favorable		Slightly Favorable		Adverse	Adverse	Adverse	✓
Airport - Bridge near Sand Coulee Creek - 57th Street *				Slightly Favorable		Slightly Favorable		Adverse	Serious Adverse	Serious Adverse	
I-315/Flood Road - Bridge - 57th Street *	Slightly Favorable	Favorable	Slightly Favorable	Slightly Favorable	Adverse			Adverse	Adverse	Adverse	
Reduced Facility	Slightly Favorable	Slightly Favorable	Adverse	Adverse		Slightly Favorable		Adverse	Adverse		

\+ This alternative could be a complimentary action with a south arterial alternative to permit staged construction.

* These alternatives have the following options:

1) Staged construction

2) The east segment could go across Gibson Flats or along the base of the ridge north of Gibson Flats.

As discussed, the "Upgrade 10th Avenue South" and the "Reduced South Arterial Facility" alternatives, while not reasonable alternatives by themselves, were retained as options for the phased construction of a south arterial alternative.

The "no action" alternative was also retained for evaluation although it does not meet the identified transportation needs. This alternative must be considered however as this is always an available course of action.

DETAILS OF THE REASONABLE ALTERNATIVES

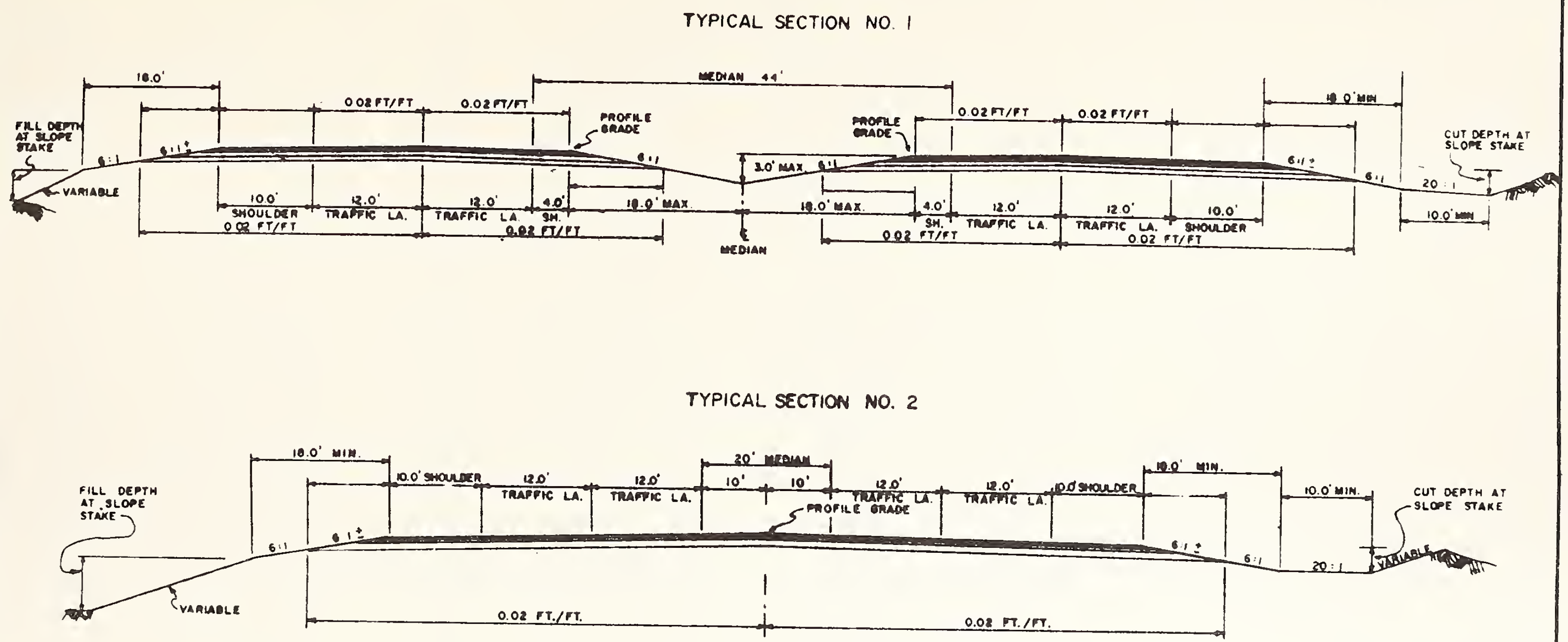
The continuous planning/EIS process has identified seven reasonable alternatives including six alternate south arterial alignments and the "no action" alternative. The six alternate alignments are composed of various combinations of five alternate route segments. These are alternate segments 4, 5, 6, B and D. For the purposes of presentation, the five alternate route segments will be discussed independently. Design options considered will also be discussed.

Typical cross sections for a south arterial facility are shown on Figure 2-4. In general, the south arterial will be a four lane divided roadway. Traffic lanes will be 12 feet in width with 10-foot wide outside shoulders. Typical section 1, used for all alignments except as noted below, provides a 44-foot wide depressed, grassed median with 4-foot wide paved inside shoulders. Typical section 2, used only with alternate B where it crosses the Gibson Flats floodplain features a 20-foot wide paved median. Preliminary design criteria have been developed using a 50 mph design speed.

The south arterial will be a controlled access facility with access limited to major street connections. Private driveway connections will be prohibited. The effects of access locations were studied utilizing computerized traffic assignments for south arterial alignments with various combinations of access locations and frontage roads. Based on this analysis it was determined that access should be provided at the following locations:

- the Gore Hill Interchange;
- Nicolai Road;
- Fox Farm Road;
- 2nd Street South;
- 13th Street South;
- 26th Street South;
- 39th Street South; and
- 57th Street at 10th Avenue South.

Frontage roads will be provided where necessary to improve access from other routes and to maintain access to abutting property. Grade separations will be provided over the Burlington Northern Railroad tracks and Flood Road west of the Missouri River and across River Drive and the Burlington Northern Railroad tracks east of the Missouri River to maintain traffic movement on those routes. Interchanges are planned for all access locations except at Nicolai Road to insure that the south arterial



GREAT FALLS SOUTH ARTERIAL

TYPICAL CROSS SECTION

FIGURE 2-4

will be able to meet transportation needs beyond the year 2000. An interchange at Nicolai Road is not considered feasible due to its proximity to the Gore Hill Interchange and to the grades required to descend Gore Hill. The Gore Hill Interchange will be expanded with the addition of a parallel two-lane overpass structure to provide the required capacity. A connecting road would be provided between River Drive and 2nd Street South as direct access to the South Arterial from River Drive is not feasible. This connecting road will cross the Burlington Northern Railroad tracks east of River Drive with an at-grade crossing.

The six south arterial alignments, 4-B, 4-D, 5-B, 5-D, 6-B, and 6-D, are shown on Figures 2-5 through 2-10. Year 2000 traffic projections are also shown for the south arterial and for selected other arterial streets. 1980 and year 2000 traffic projections for the "no action" alternative are shown on Figure 2-11.

Alternate Segment 4

Alternate segment 4 is the most southerly and longest of the three alternates west of 26th Street South. Beginning on airport road approximately 0.3 miles north of the Gore Hill Interchange, the alignment proceeds across Interstate 15 in a southeasterly direction across the SE¼ of Section 21-T20N-R3E of the Montana Principle Meridian and across the NE¼ of Section 28-T20N-R3E. It then proceeds easterly across the N½ of Sections 27 and 26-T20N-R3E and curves northeasterly to cross the Missouri River. The alignment continues northeasterly and easterly across the S½ of Section 24-T20N-R3E. It continues east across the center of Section 19-T20N-R4E parallel to and south of Gibson Road to 26th Street South.

The overall length of alternate segment 4 is 5.53 miles. The maximum grade would be approximately 6.8 percent descending Gore Hill. Alternate segment 4 crosses the Missouri River south of Taylor Island, crossing the northern tip of a marshy area on the west bank of the River. Due to the crossing location, this alternate is able to cross the Missouri River, River Drive, and the Burlington Northern Railroad with the same crossing structures. Total structure length for this crossing is 1730 feet.

Total estimated cost for alternate segment 4 is $21,751,600. This cost includes $17,796,500 construction, $1,997,500 for right-of-way, and $1,957,600 for engineering.

Alternate Segment 5

Alternate segment 5 is similar to alternate segment 4 except that it descends Gore Hill at a location slightly north of alternate segment 4, crossing the extreme southwest corner of Section 22-T20N-R3E. Alternate segment 5 merges with alternate segment 4 at the Missouri River crossing and follows the alignment of alternate segment 4 east to 26th Street South.

The overall length of alternate segment 5 is 5.32 miles. The maximum grade for this alignment would be approximately 6.0 percent descending Gore Hill. This is somewhat less than for alternate segments 4 or 6, primarily because alternate segment 5 crosses two coulees which allow

the descent to be effected over a longer distance. Centerline cuts and fills and haul distances would also be less than for alternate segments 4 and 6. The crossing of the Missouri River, River Drive, and the Burlington Northern Railroad would be identical to that of alternate segment 4. Total structure length for this crossing would again be 1730 feet.

Total estimated cost for alternate segment 5 is $21,165,000. This cost includes $17,327,000 for construction, $1,932,000 for right-of-way and $1,906,000 for engineering.

Alternate Segment 6

Alternate segment 6 is the most northerly and shortest of the three alternate alignments west of 26th Street South. Beginning on Airport Road approximately 0.3 miles north of the Gore Hill Interchange, the alignment proceeds southeasterly across the Gore Hill Interchange and curves immediately easterly to cross the SE¼ of Section 21-T20N-R3E and the south ½ of Sections 22 and 23-T20N-R3E. This alignment crosses the Missouri River near the center of said Section 23 and crosses the north tip of Taylor Island. It then continues easterly across the center of Section 24-T20N-R3E and merges with alternate segments 4 and 5 just west of 13th Street South. All three alternate segments follow a common alignment from 13th Street South to 26th Street South being just south of and parallel to Gibson Road.

Alternate segment 6 crosses two parcels owned by School District #1 and land east of Fox Farm Road planned for parkland development by the City of Great Falls. Taylor Island is also designated as official parkland. The alignment passes just south of the heavily developed areas of the Grande Vista Addition and Fox Farm Addition west of the Missouri River and passes through a heavily developed area east of the Missouri River.

The overall length of alternate segment 6 is 4.98 miles. The maximum grade would be 7.0 percent descending Gore Hill. Due to the location of the River crossing, separate crossing structures would be required for the Missouri River crossing and for the River Drive/BNRR crossing. Total structure length for these crossings would be 1890 feet.

Total estimated cost for alternate segment 6 is $23,360,900. This cost includes $18,599,100 for construction, $2,715,900 for right-of-way, and $2,045,900 for engineering.

Alternate Segment B

Alternate segment B begins immediately west of 26th Street South and proceeds easterly across Gibson Flats crossing the center of Section 20-T20N-R4E. It then curves northerly, crossing the extreme southeast corner of Section 16-T20N-R4E and the west ½ of Section 15-T20N-R4E, continuing to the eastern project terminus approximately 0.35 miles north of the intersection of 10th Avenue South and 57th Street.

Alternate segment B would cross the floodplain of Sand Coulee Creek. It would require approximately 100,000 cubic yards of borrow to construct the fill needed to cross Gibson Flats with a grade separated access facility at 39th Street South (Shields Avenue) and a truck underpass for a haul road near the north-south ¼ section line in Section 21.

The overall length of alternate segment B is 3.39 miles. The maximum grade is approximately 3.7 percent just east of 26th Street South descending into Gibson Flats.

The total estimated cost for alternate segment B is $8,567,600. This cost includes $5,941,000 for construction, $1,973,100 for right-of-way, and $653,500 for engineering.

Alternate Segment D

Alternate segment D also begins immediately west of 26th Street South. It proceeds northeasterly across the NW¼ of Section 20-T20N-R4E. It then continues easterly in a curvilinear alignment dropping into Gibson Flats and following the base of the ridge north of the Flats, crossing the extreme northwest corner of the NE¼ of said Section 20, the SE¼ of Section 17-T20N-R4E, and the south ½ of Section 16-T20N-R4E. The alignment then curves northerly, where it merges with alternate segment B and follows a common alignment to the eastern project terminus approximately 0.35 miles north of the intersection of 10th Avenue South and 57th Street.

Alternate segment D skirts the north edge of the floodplain in Gibson Flats and crosses a marshy area at the base of the ridge in Section 17 at the proposed 39th Street South access location. Borrow material will not be required with alternate segment D as it will be with alternate segment B. A truck underpass will be provided for the truck haul road near the north-south ¼ Section line in Section 16 to maintain access to the gravel pit to the south.

The overall length of alternate segment D is 3.53 miles. The maximum grade is approximately 2.7 percent immediately east of 26th Street South.

The total estimated cost for alternate segment D is $8,846,000. This cost includes $6,035,300 for construction, $2,146,800 for right-of-way, and $663,900 for engineering.

Design Options

Several design options have been considered for the south arterial. These include staged construction, at-grade intersections versus interchanges, optional interchange configurations at 10th Avenue South and 57th Street, and optional access locations.

Staged Construction. Due to the magnitude of the south arterial project and to funding limitations, consideration was given to staged construction. This option offers many advantages and will minimize the financial impact of project implementation while providing a facility to meet growing transportation needs. This option could be implemented with any of the south arterial alternates.

A general sequence for staged construction would be:

- Acquisition of full right-of-way;
- Upgrade 10th Avenue South;
- Construct the south arterial in three priority segments with two lanes and at grade intersections initially;
- Upgrade to four lanes using priority sequence; and
- Provide interchanges at all designated access locations.

A key element of this option is the early acquisition of right-of-way for the full facility, including right-of-way for interchanges. This would minimize impacts to future development, permit more orderly growth in the project area, and also protect against the public's future expenditure for escalating property values.

Another key element of this option would be to upgrade 10th Avenue South as recommended in the 10th Avenue South Improvement Plan prior to construction of the south arterial. The key recommendations of this report are to reconstruct and widen portions of 10th Avenue South within the existing right-of-way, to install a computerized traffic signal control system, and to upgrade street lighting. The total estimated cost of these improvements is $8,628,000 including engineering and administrative costs. These improvements will provide temporary relief of congestion on 10th Avenue South until construction of the south arterial can be initiated.

Construction of the south arterial would be accomplished in three priority segments. These are:

- Fox Farm Road to 26th Street South;
- the Gore Hill Interchange to Fox Farm Road; and
- 26th Street South to 57th Street.

Initially two lanes would be provided with at-grade intersections wherever feasible. The facility will then be upgraded to four lanes using the same priority sequence. Finally interchanges would be provided at all designated access locations except at Nicolai Road as discussed earlier.

The minimum facility needed to handle year 2000 traffic projections would include a four lane roadway from Fox Farm Road to 26th Street South and two lanes for the balance of the corridor. The remainder of the construction could take place beyond the year 2000.

<u>At-Grade Intersections Versus Interchanges</u>. The full facility south arterial alternates discussed above include interchanges at all access locations except at Nicolai Road. From a traffic standpoint, at-grade intersections could handle design year traffic volumes. However, it appears that physical conditions would require grade separations at Fox Farm Road, 2nd Street South, and 39th Street South for the full facility. Construction of at-grade intersections at the other access locations is an option which would reduce total construction costs.

While at-grade intersections can be designed to handle Year 2000 traffic at 13th Street South, 26th Street South, and 57th Street, heavy left turn volumes at these locations would require multiple left turn lanes or turning restrictions. Interchanges at these locations would provide operational benefits and would insure that the south arterial would be able to meet transportation needs beyond the year 2000.

Design Options at 10th Avenue South and 57th Street. Alternate segments B and D as discussed in this statement utilize a partial cloverleaf interchange configuration at the eastern terminus of the project. However a full diamond interchange was also considered and is a design option at this location. For both configurations the south arterial would be designed as the through highway as traffic projections on this route are greater than for 10th Avenue South.

A diamond interchange offers the advantages of lower right-of-way costs and it would have less impact on neighboring properties. It would not require the relocation of any existing homes or businesses. However, construction costs would be higher than for a partial cloverleaf interchange. Also, heavy left turn volumes off of 10th Avenue South make this interchange configuration less efficient than a partial cloverleaf. Dual left turn lanes and traffic signal control would be required on 10th Avenue South at both ramp terminals.

With a partial cloverleaf interchange the conflicts between heavy left turn traffic and through traffic and the need for signalization can be eliminated, providing operational benefits. This configuration would also have lower construction cost and would be superior from the standpoint of operations at Malmstrom Air Force Base as convoys and maintenance vehicles would frequently use this interchange. Right-of-way costs would be greater with this option as it would require the relocation of two commercial businesses in the northwest quadrant of the interchange.

Design Options for Access Locations. At a minimum access should be provided to the south arterial at the following locations in addition to the project termini:

- Nicolai Road;
- Fox Farm Road;
- 2nd Street South;
- 13th Street South; and
- 26th Street South.

The full facility south arterial alternates, as discussed in this statement, include access at these locations and also include access at 39th Street South. Two design options are available for any of the alternates. These are to add access to the south arterial from Flood Road or to eliminate access from 39th Street South.

Fox Farm Road is the major north-south arterial route west of the Missouri River. Access to the south arterial from Flood Road would reduce traffic volumes somewhat on Fox Farm Road. A grade separation structure will be provided over Flood Road even without access here. Therefore the cost of providing access at Flood Road would be reduced. However, Flood Road and Fox Farm Road are only one-half mile apart. Weaving problems would be experienced between the interchange ramps of these access facilities. Access to the south arterial at Flood Road will not significantly affect traffic volumes on I-315 or on 10th Avenue South. Also, even without access at Flood Road, traffic volumes on Fox Farm Road will be less with the south arterial than with the "no action" alternative in the vicinity of Meadowlark School and 10th Avenue South.

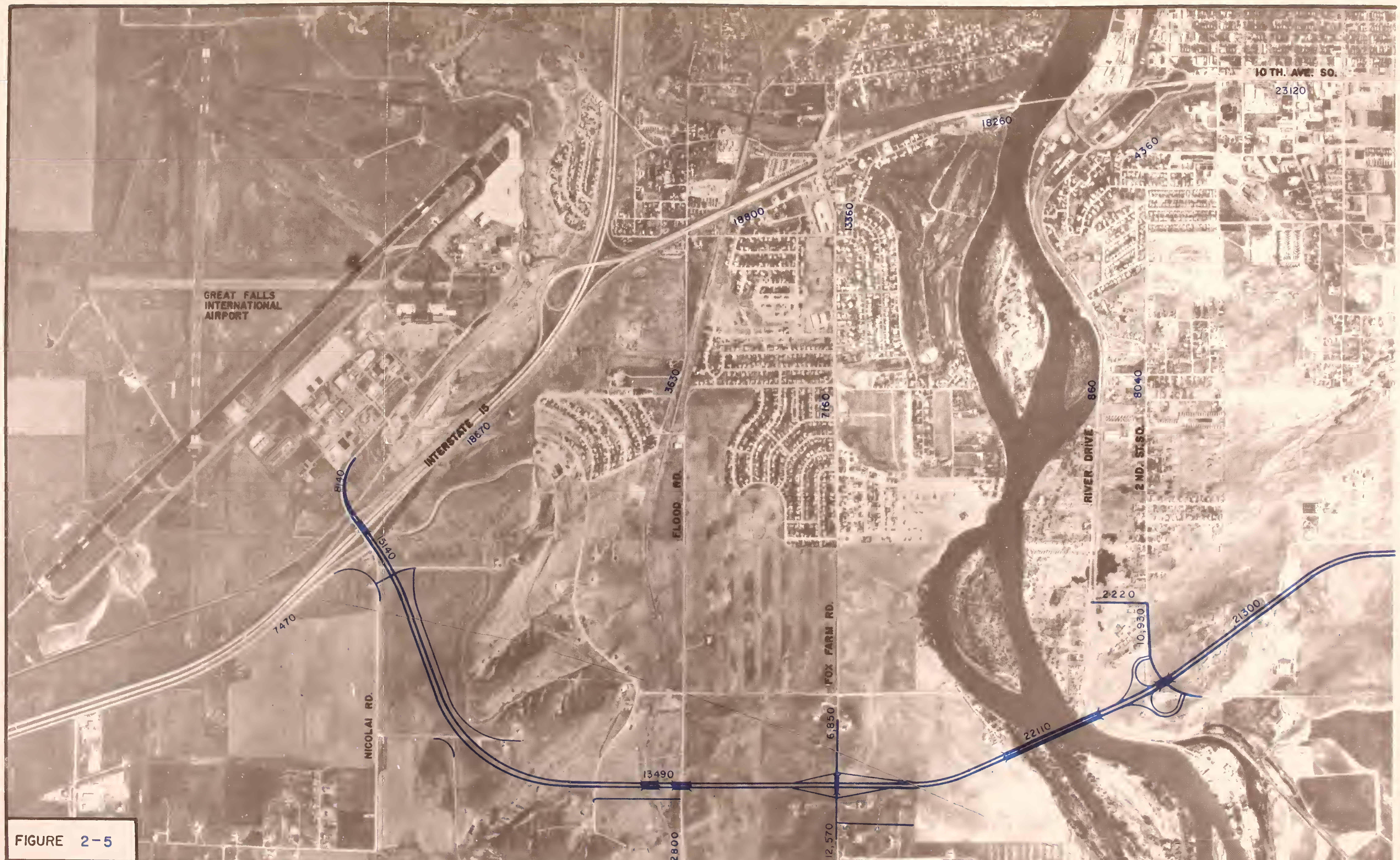
Extension of 39th Street South to connect with the south arterial appears to offer several advantages. These include additional reduction in traffic volumes on 10th Avenue South and improved access to the south arterial particularly with alternate segment D. 39th Street South would serve as a north-south arterial route, providing a good north-south arterial spacing for the area south of 10th Avenue South. However, traffic volumes on 39th Street will increase with access here. Also construction costs would be high since 39th Street South would have to be extended south and it would cross a wetland area at the base of the ridge north of Gibson Flats. Without access at 39th Street South, grades on alternate segment B could be lowered and earthwork volumes could be reduced, eliminating the need for most of the borrow material which would otherwise be needed.

No Action Alternative

The "no action" alternative implies no activities beyond the routine maintenance of 10th Avenue South. It is also assumed that the expansion of the Warden Bridge would be completed as scheduled, providing some temporary relief to the 10th Avenue South congestion in this area. As previously stated, pavement condition of 10th Avenue South is such that major renovation of certain segments will be necessary to maintain existing traffic levels.

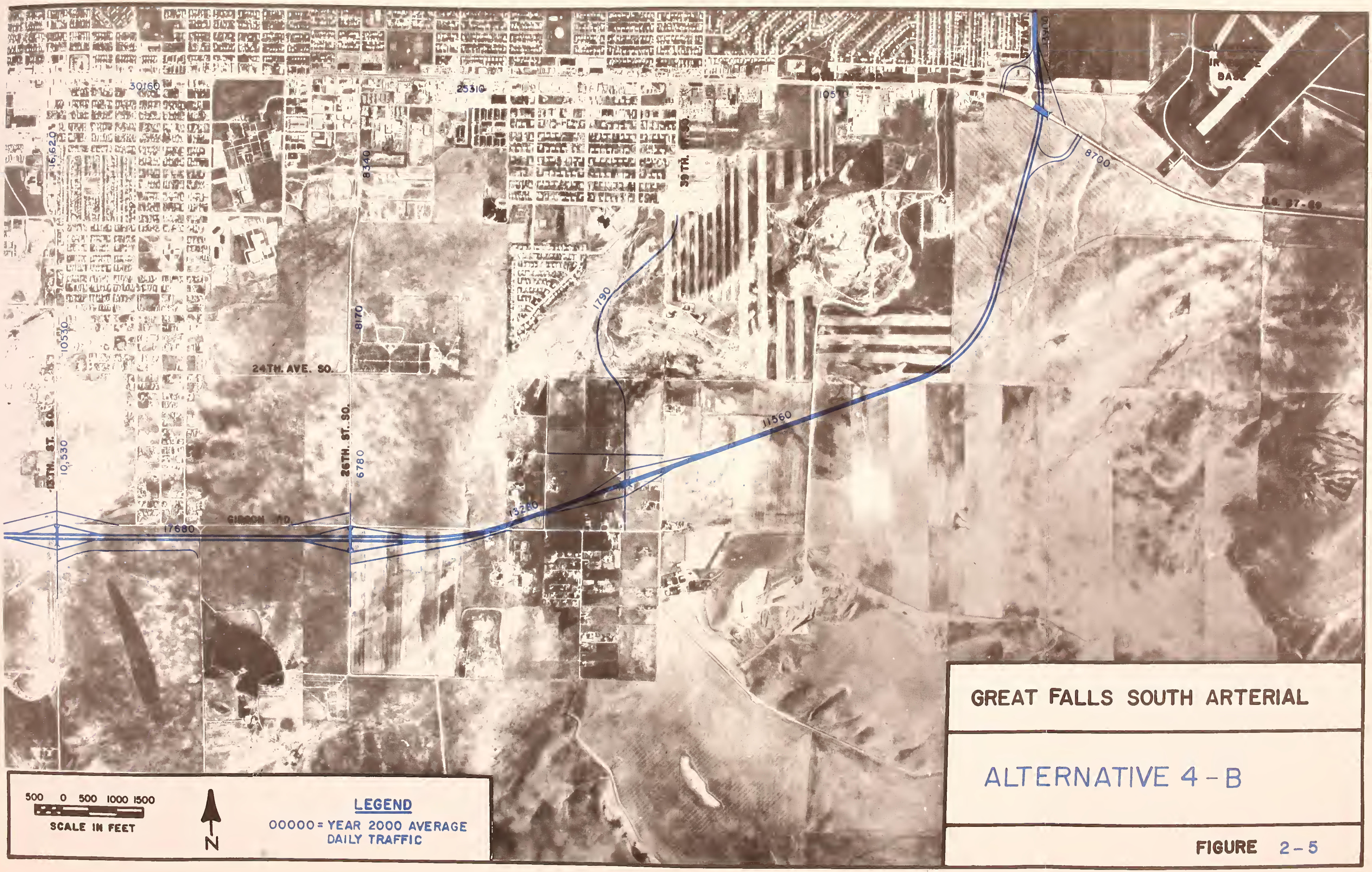
Adoption of the "no action" alternative would have no impact on the biophysical environment of the south arterial corridor. It would further degrade the air quality along 10th Avenue South, which presently does not meet EPA Standards, as traffic volumes increase and traffic flow is impeded. The increased traffic congestion and traffic delay times could have a negative economic effect on commercial development along 10th Avenue South. Noise levels would also increase as traffic volumes increase.

The "no action" alternative does not meet the transportation needs as identified. Also it would have a detrimental effect on land use planning for the area south of 10th Avenue South as a right-of-way corridor for a south arterial facility would not be defined.



10 TH. AVE. SO.
23120
18260
4360
18800
13360
GREAT FALLS
INTERNATIONAL
AIRPORT
3630
7160
860
8040
INTERSTATE 15
18670
RIVER DRIVE
2 ND. ST. SO.
8140
FLOOD RD.
15140
2220
10,930
21300
7470
FOX FARM RD.
NICOLAI RD.
22110
6,850
13490
2800
12,570

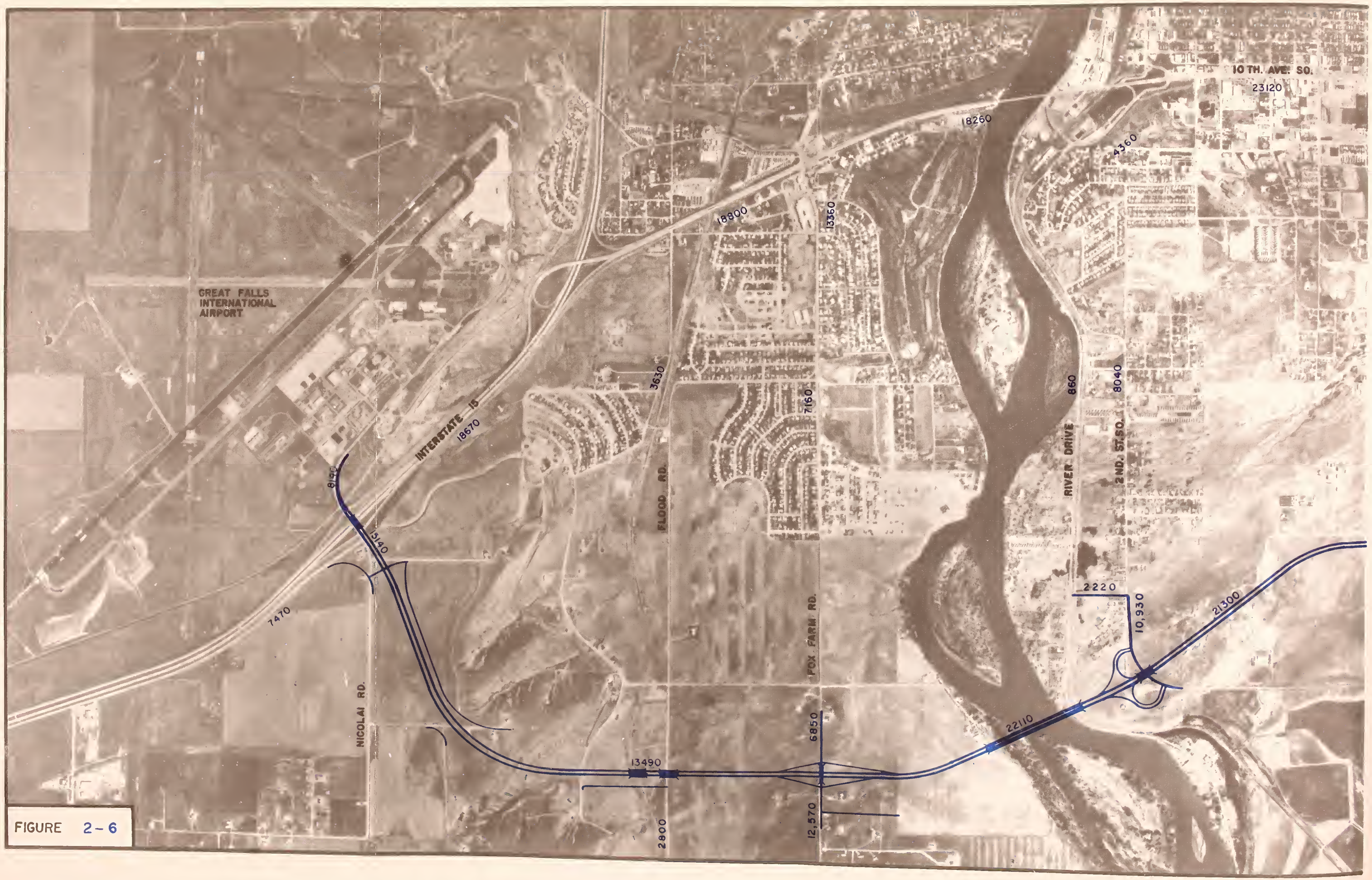
FIGURE 2-5



GREAT FALLS SOUTH ARTERIAL

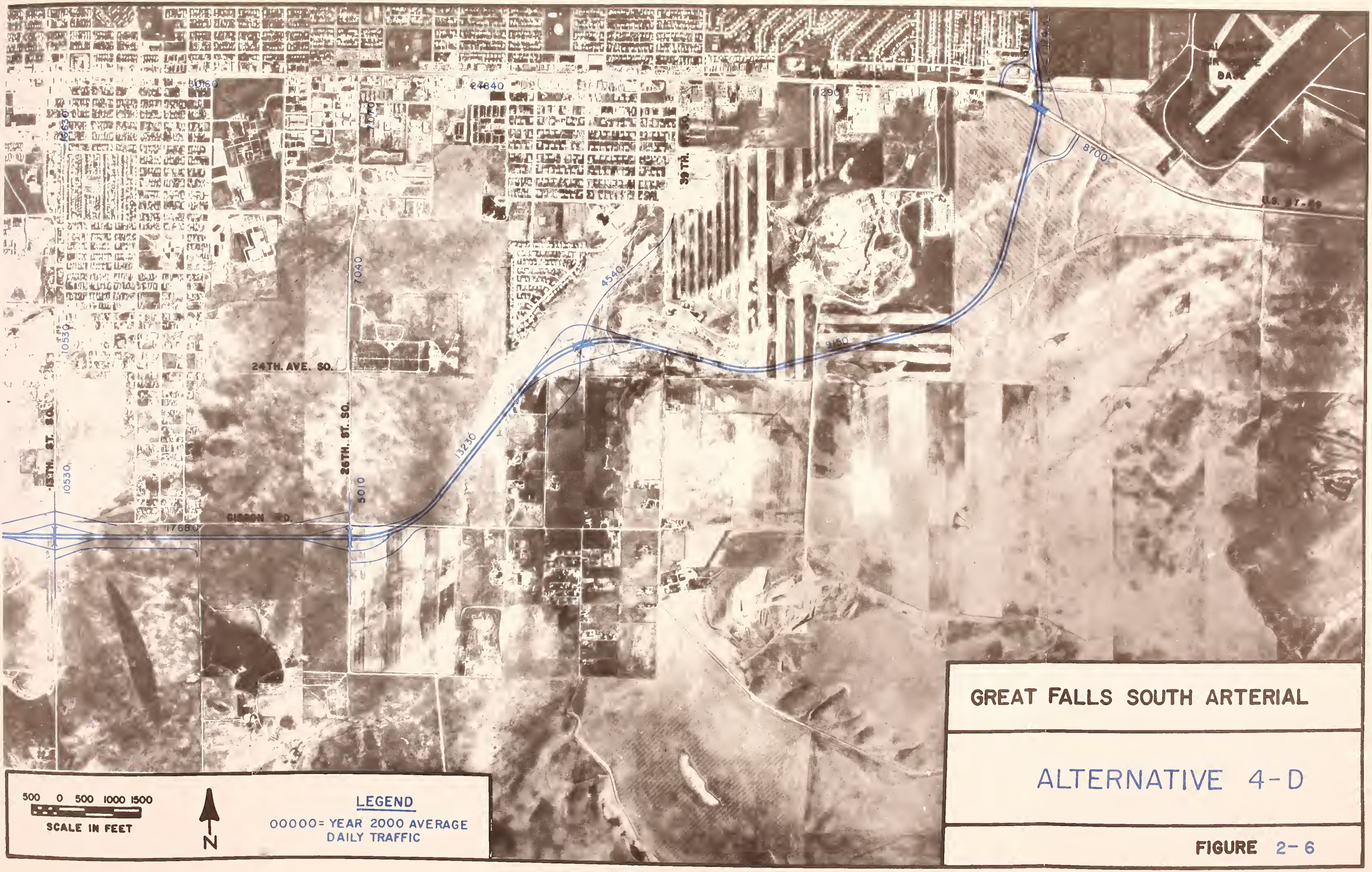
ALTERNATIVE 4 - B

FIGURE 2-5



10 TH. AVE. SO.
23120
18260
4360
18800
13360
GREAT FALLS INTERNATIONAL AIRPORT
3630
7160
860
8040
INTERSTATE 15
18670
RIVER DRIVE
2 ND. ST. SO.
FLOOD RD.
8130
13140
7470
2220
10,930
21300
FOX FARM RD.
NICOLAI RD.
6850
22110
13490
2800
12,570

FIGURE 2-6

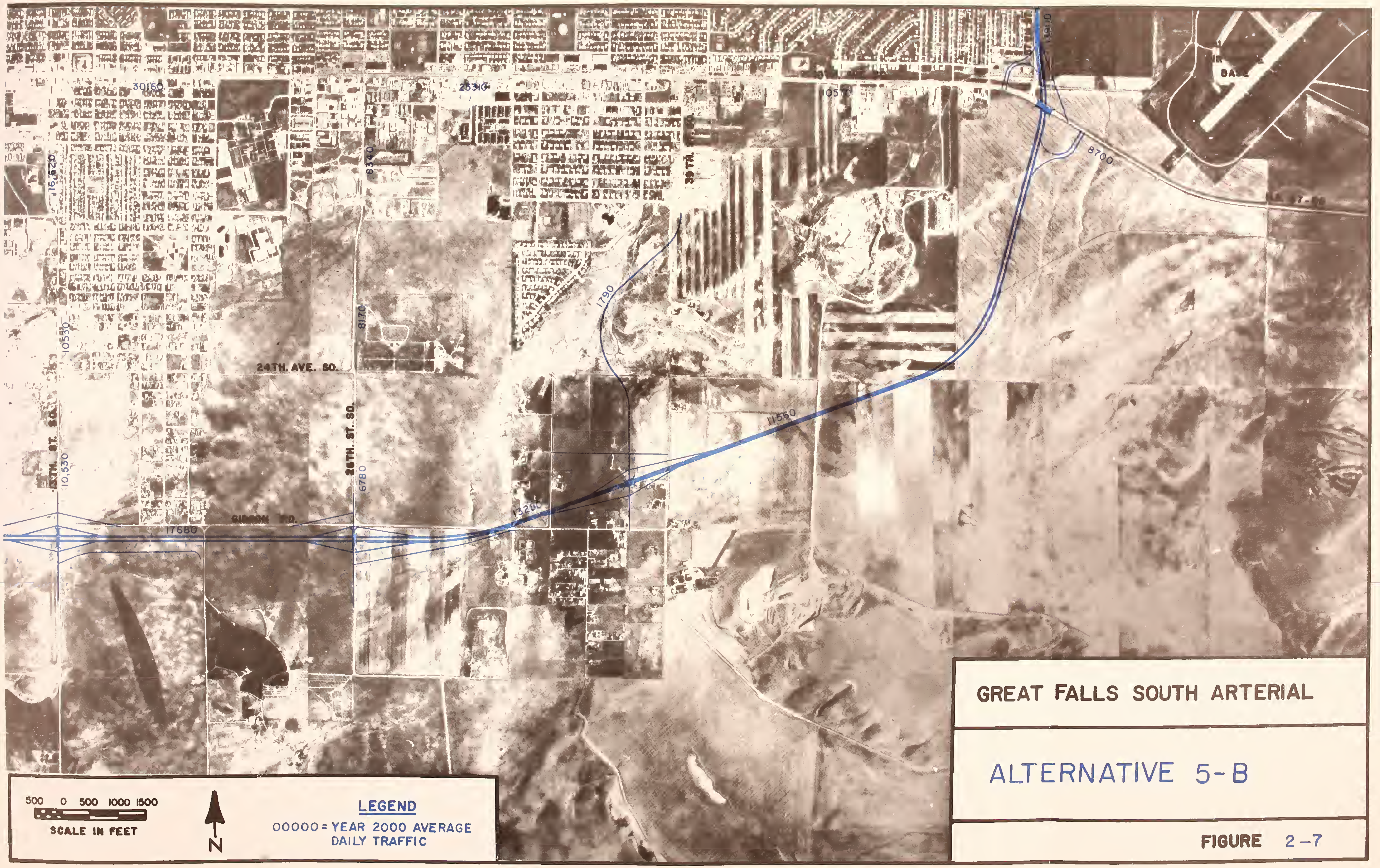


GREAT FALLS SOUTH ARTERIAL
ALTERNATIVE 4-D
24TH. AVE. SO.
26TH. ST. SO.
15TH. ST. SO.
39 TH.
GIBSON RD.
U.S. 87-89
30160
24840
11290
10630
7070
7040
4540
8700
9150
13230
10530
10530
5010
17680
500 0 500 1000 1500
SCALE IN FEET
N
LEGEND
00000= YEAR 2000 AVERAGE DAILY TRAFFIC

FIGURE 2-6

10 TH. AVE. SO.
23120
18260
4360
18800
13360
GREAT FALLS
INTERNATIONAL
AIRPORT
3630
7160
860
8040
INTERSTATE 15
18670
8140
FLOOD RD.
RIVER DRIVE
2 ND. ST. SO.
5140
2220
10,930
21,300
7470
FOX FARM RD.
13,490
6850
22110
NICOLAI RD.
2800
12,570

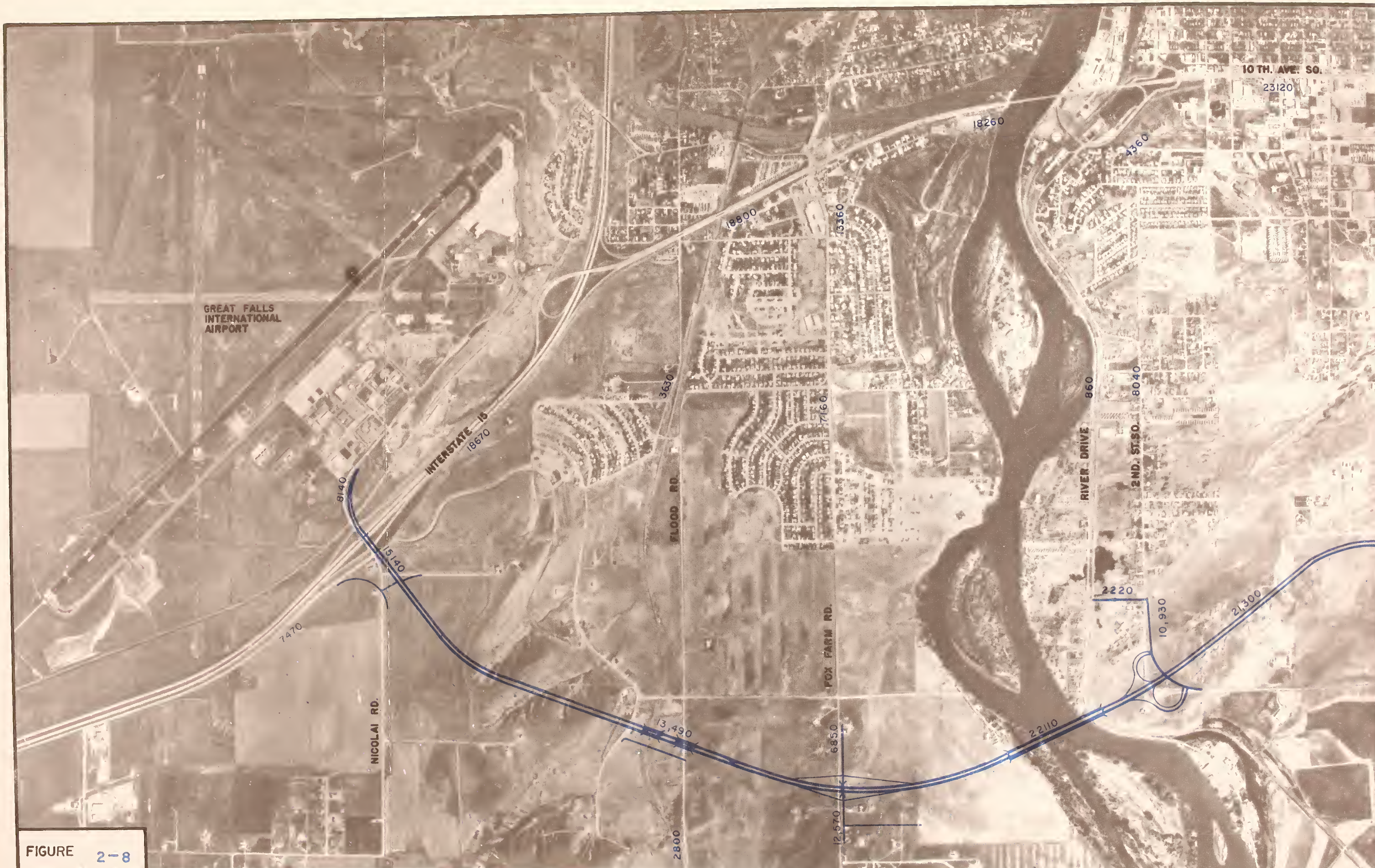
FIGURE 2-7

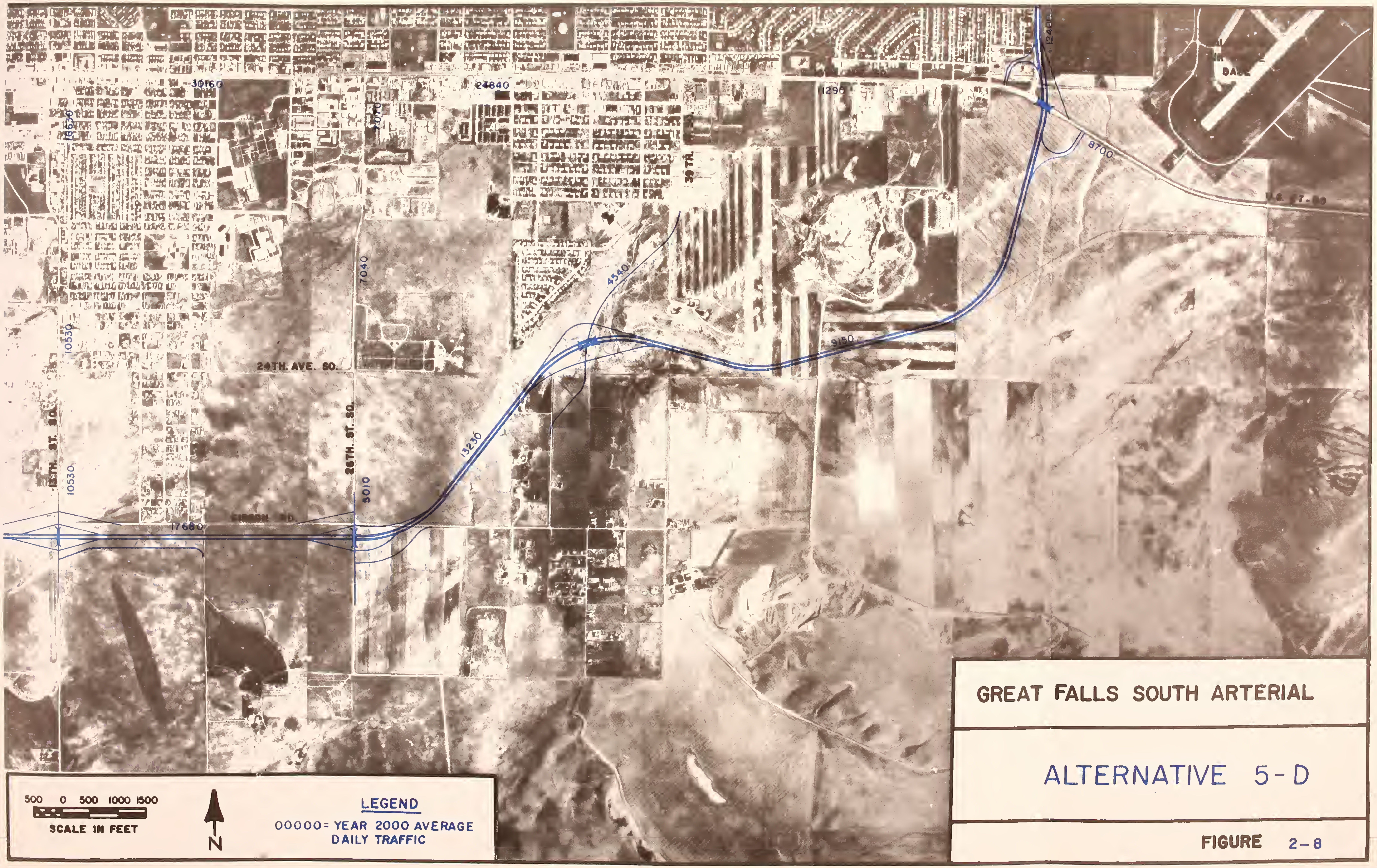


GREAT FALLS SOUTH ARTERIAL

ALTERNATIVE 5-B

FIGURE 2-7

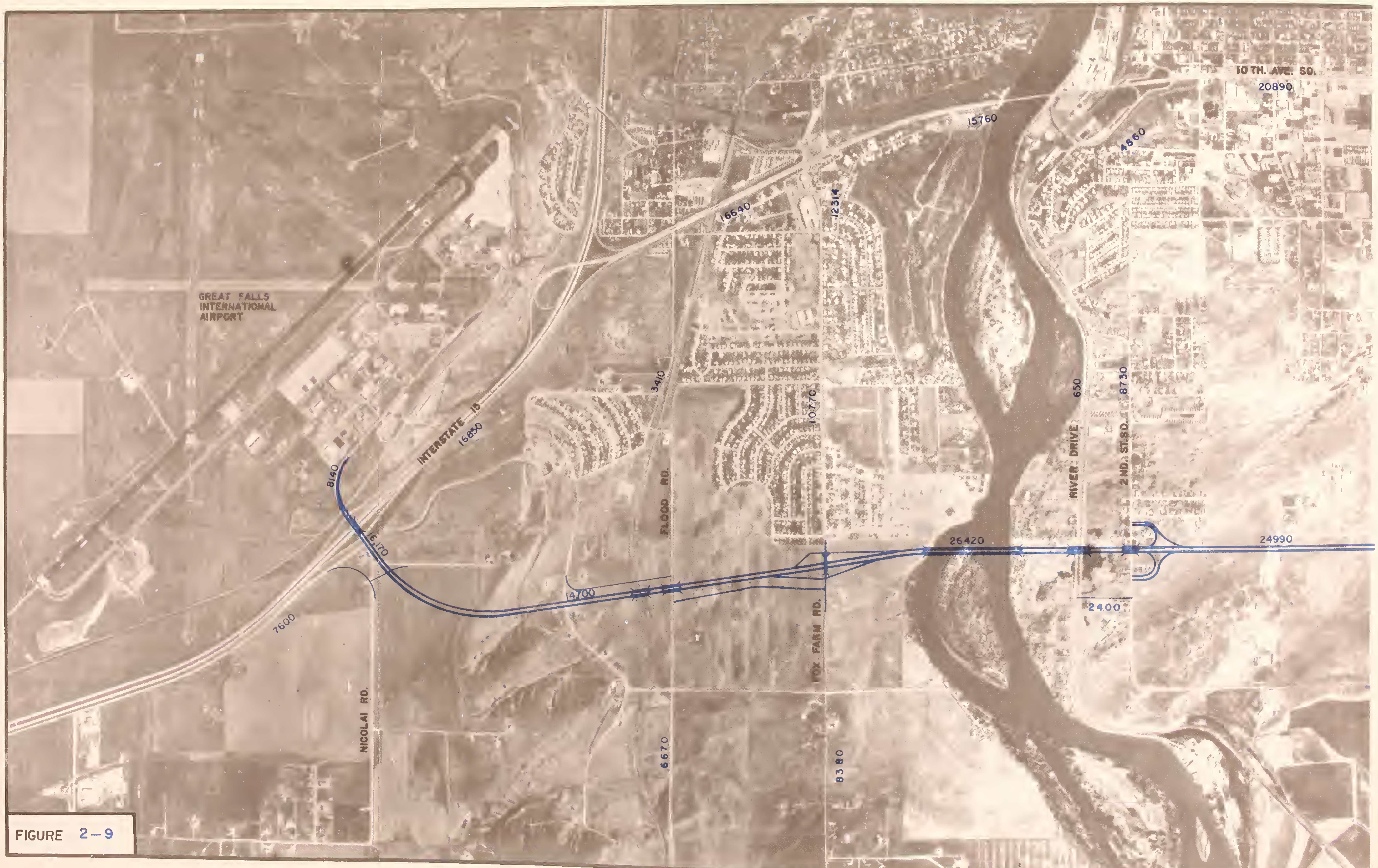

10 TH. AVE. SO.
23120
18260
4360
GREAT FALLS
INTERNATIONAL
AIRPORT
18800
13360
3630
7160
860
8040
RIVER DRIVE
2 ND. ST. SO.
INTERSTATE 15
18670
8140
15140
FLOOD RD.
2220
10,930
21,300
7470
FOX FARM RD.
NICOLAI RD.
13,490
6850
22110
12,570
2800
FIGURE 2-8



GREAT FALLS SOUTH ARTERIAL

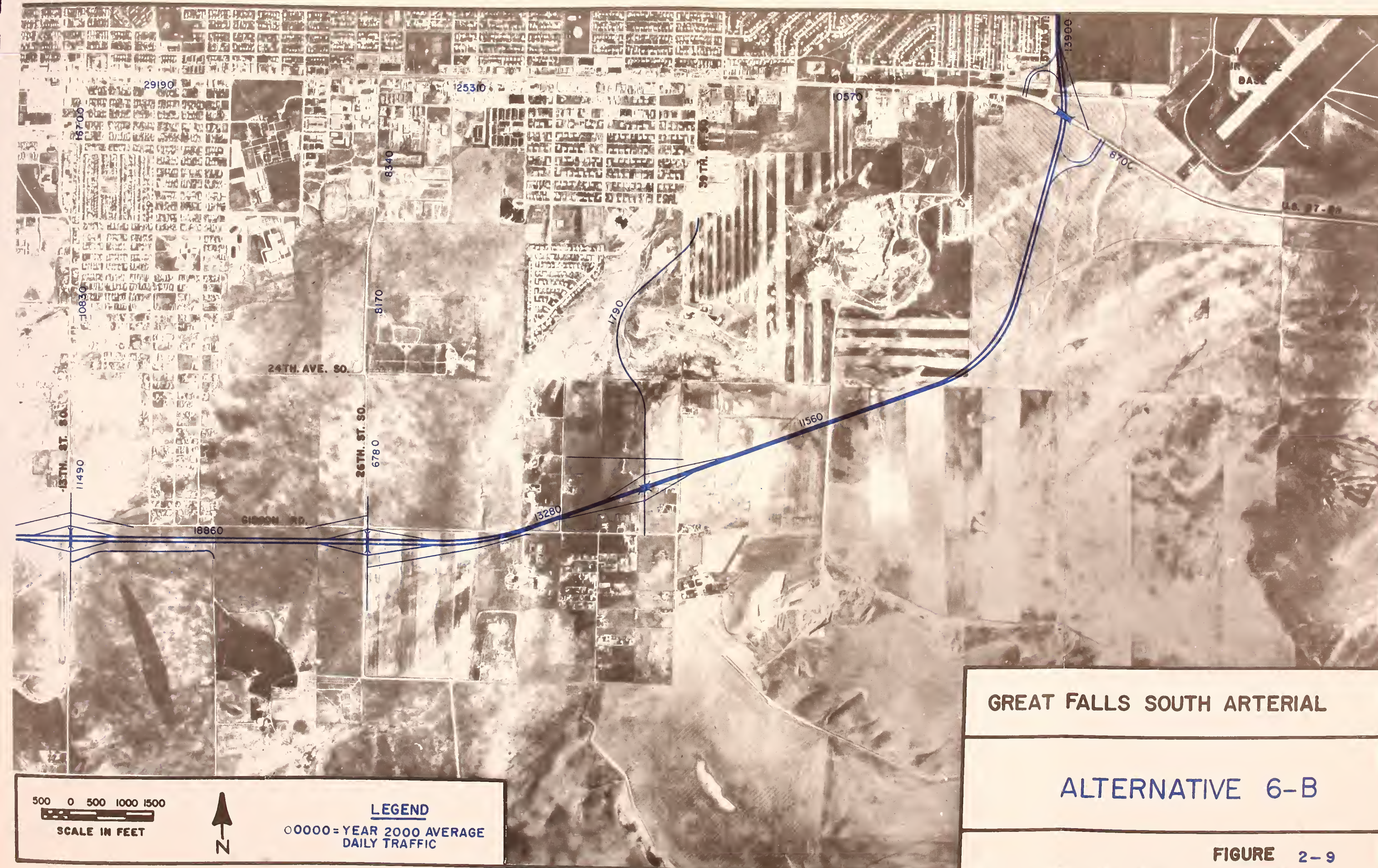
ALTERNATIVE 5-D

FIGURE 2-8



10 TH. AVE. SO.
20890
15760
4860
16640
12314
GREAT FALLS
INTERNATIONAL
AIRPORT
3410
10770
650
8730
INTERSTATE 15
16850
RIVER DRIVE
2 ND. ST. SO.
8140
FLOOD RD.
16170
26420
24990
14700
2400
7600
FOX FARM RD.
NICOLAI RD.
6670
8380

FIGURE 2-9



GREAT FALLS SOUTH ARTERIAL

ALTERNATIVE 6-B

FIGURE 2-9

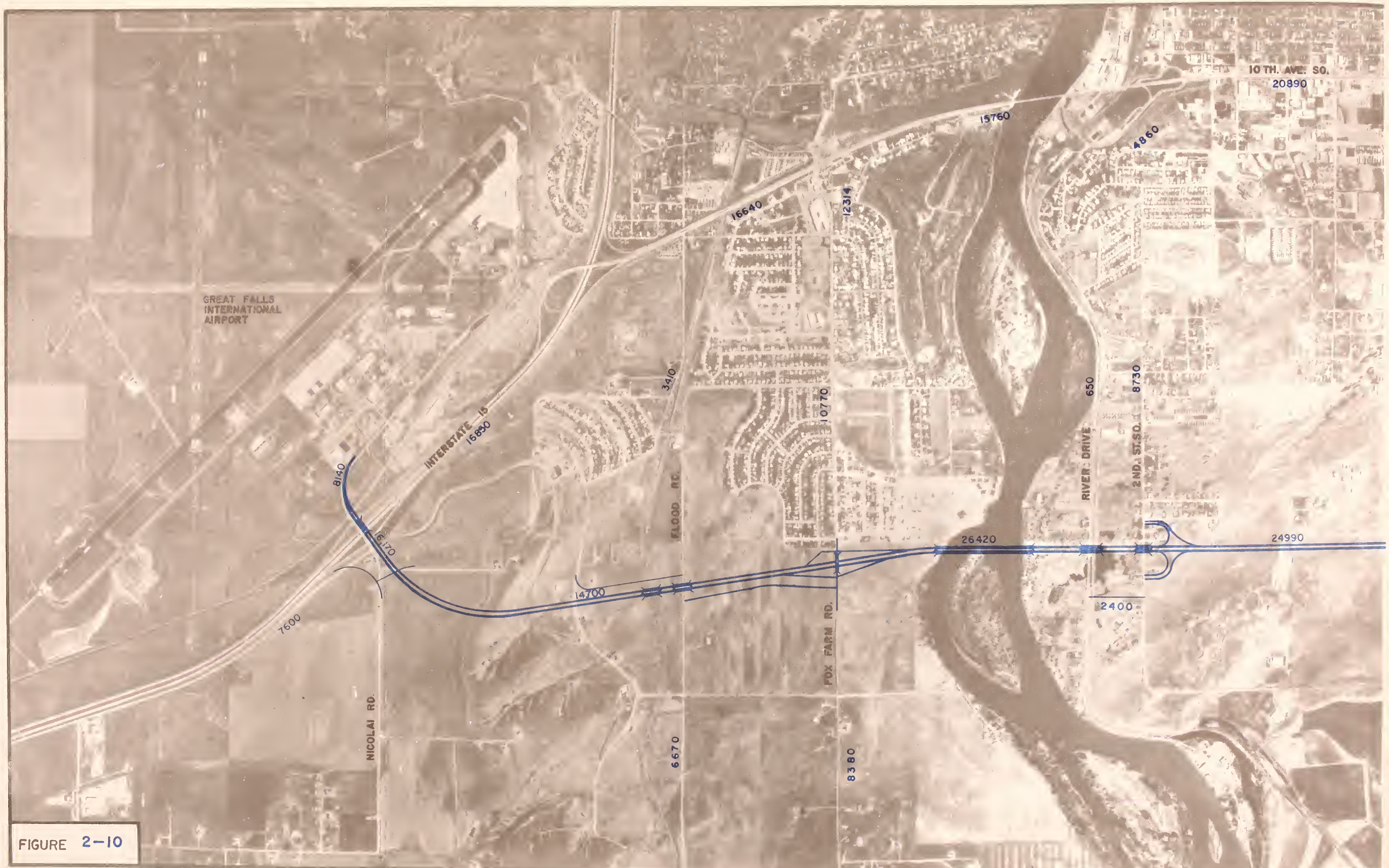
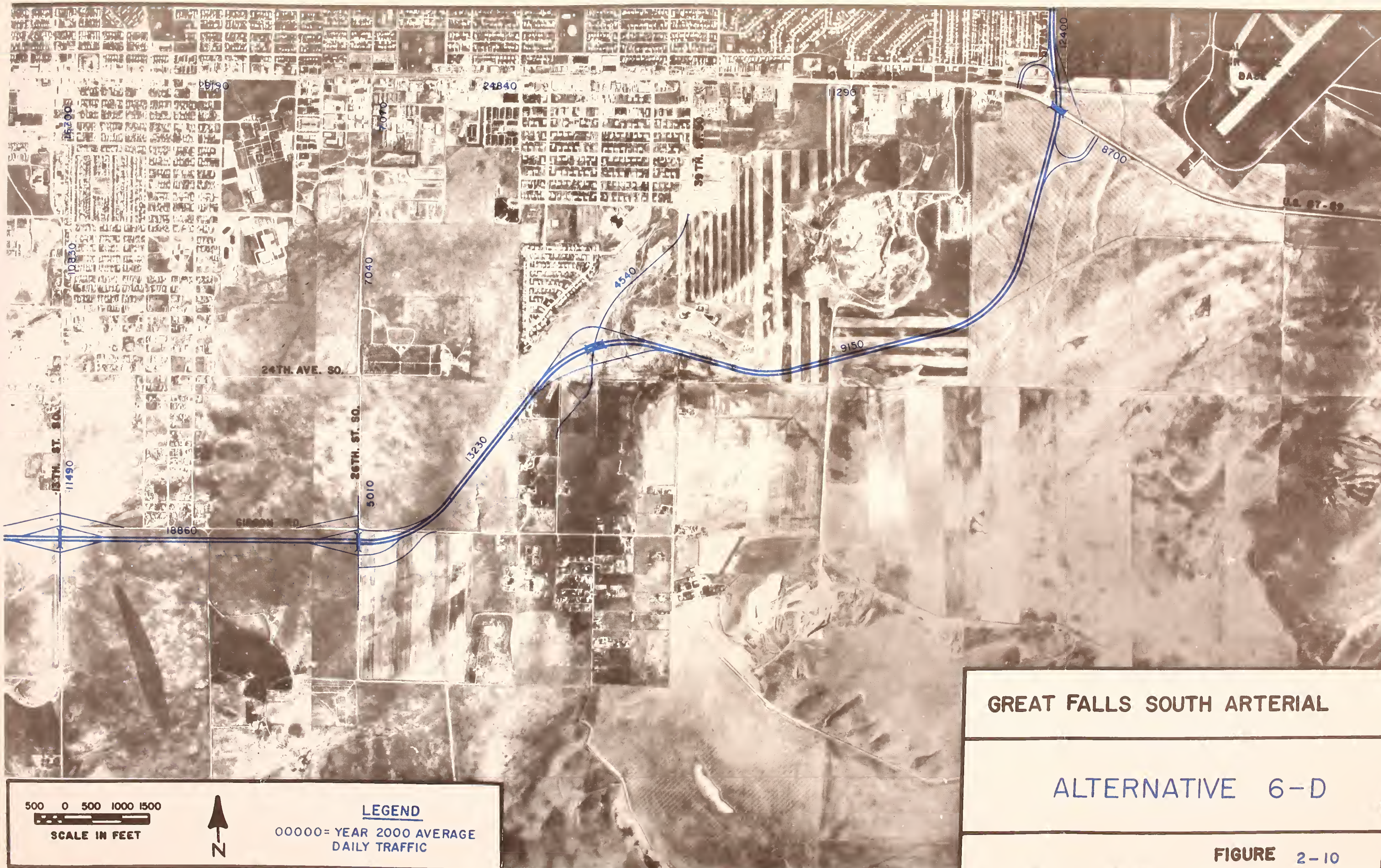

10 TH. AVE. SO.
20890
15760
4860
16640
12314
GREAT FALLS
INTERNATIONAL
AIRPORT
3410
10770
650
8730
INTERSTATE 15
16880
8140
RIVER DRIVE
2ND. ST. SO.
FLOOD RD.
26420
24990
16,170
14700
2400
7600
FOX FARM RD.
NICOLAI RD.
6670
8380

FIGURE 2—10



GREAT FALLS SOUTH ARTERIAL

ALTERNATIVE 6-D

FIGURE 2-10

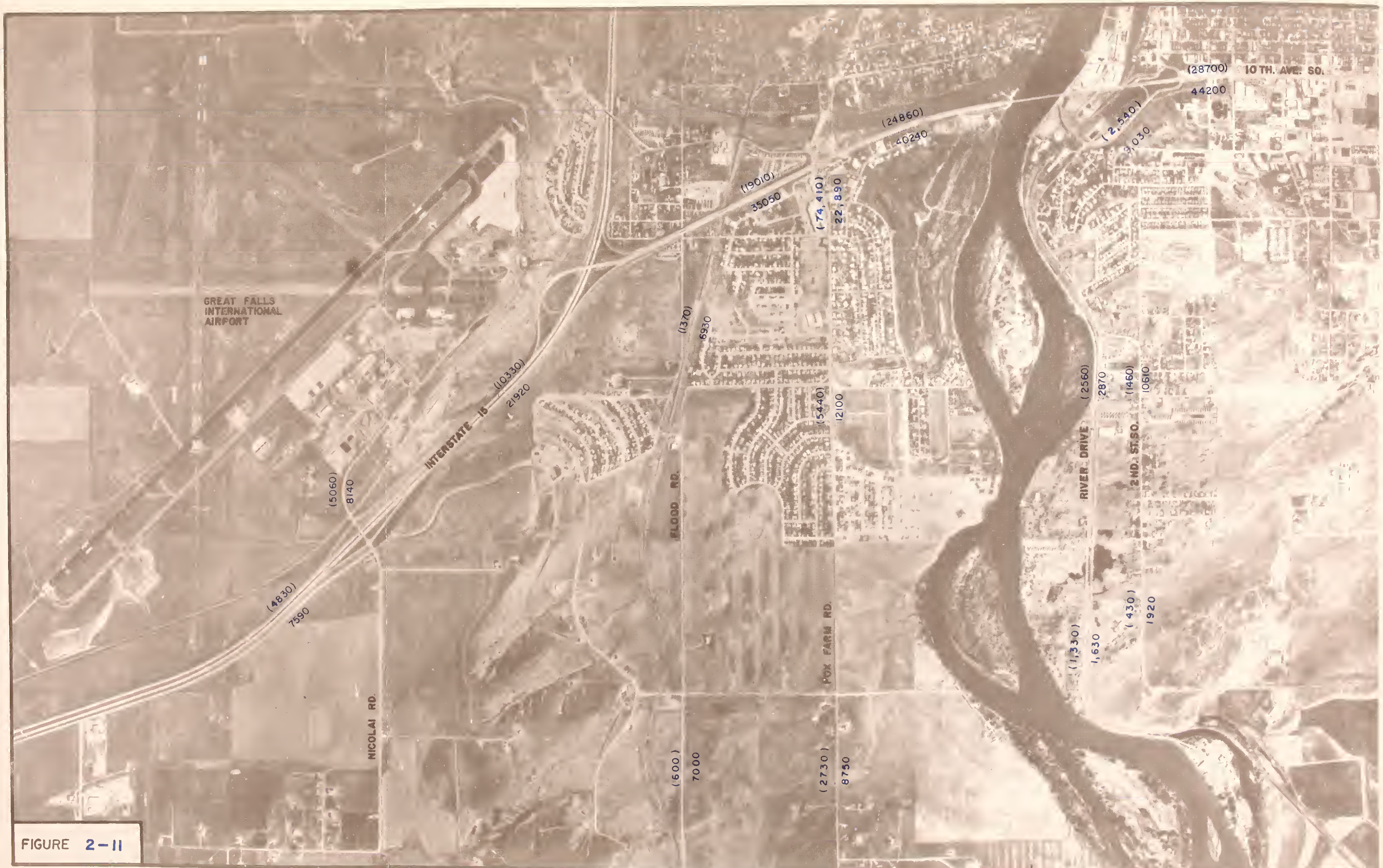
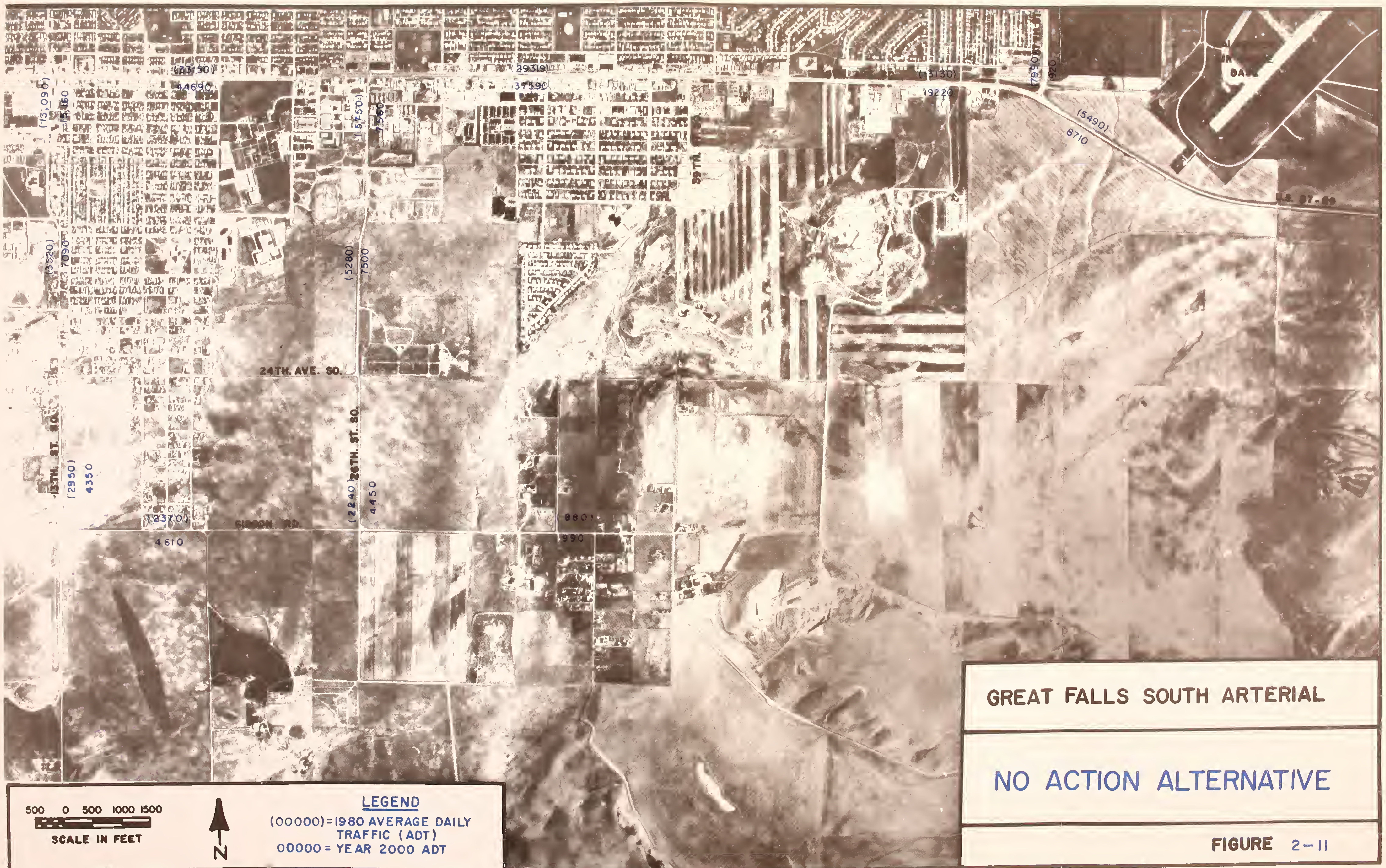

GREAT FALLS INTERNATIONAL AIRPORT
INTERSTATE 15
(10330)
21920
(5060)
8140
(4830)
7590
NICOLAI RD.
FLOOD RD.
(1370)
6930
(600)
7000
FOX FARM RD.
(2730)
8750
(5440)
12100
(74,410)
22,890
(19010)
35050
(24860)
40240
(28700)
44200
10 TH. AVE. SO.
(2,540)
3,030
RIVER DRIVE
(2560)
2870
2ND. ST. SO.
(1460)
10610
(1,330)
1,630
(430)
1920

FIGURE 2-11



GREAT FALLS SOUTH ARTERIAL

NO ACTION ALTERNATIVE

FIGURE 2-11

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter will discuss the probable effects of the proposed project on the existing environment. Each environmental impact parameter will be listed with a brief description of the existing relevant environment, the probable environmental effects of the various route alternatives on the selected parameter, and an evaluation of mitigation measures proposed to minimize the adverse environmental impacts.

The impacts addressed in this chapter are grouped under two major headings: Impacts on the Human Environment, and Impacts on the Natural Environment. These impacts include:

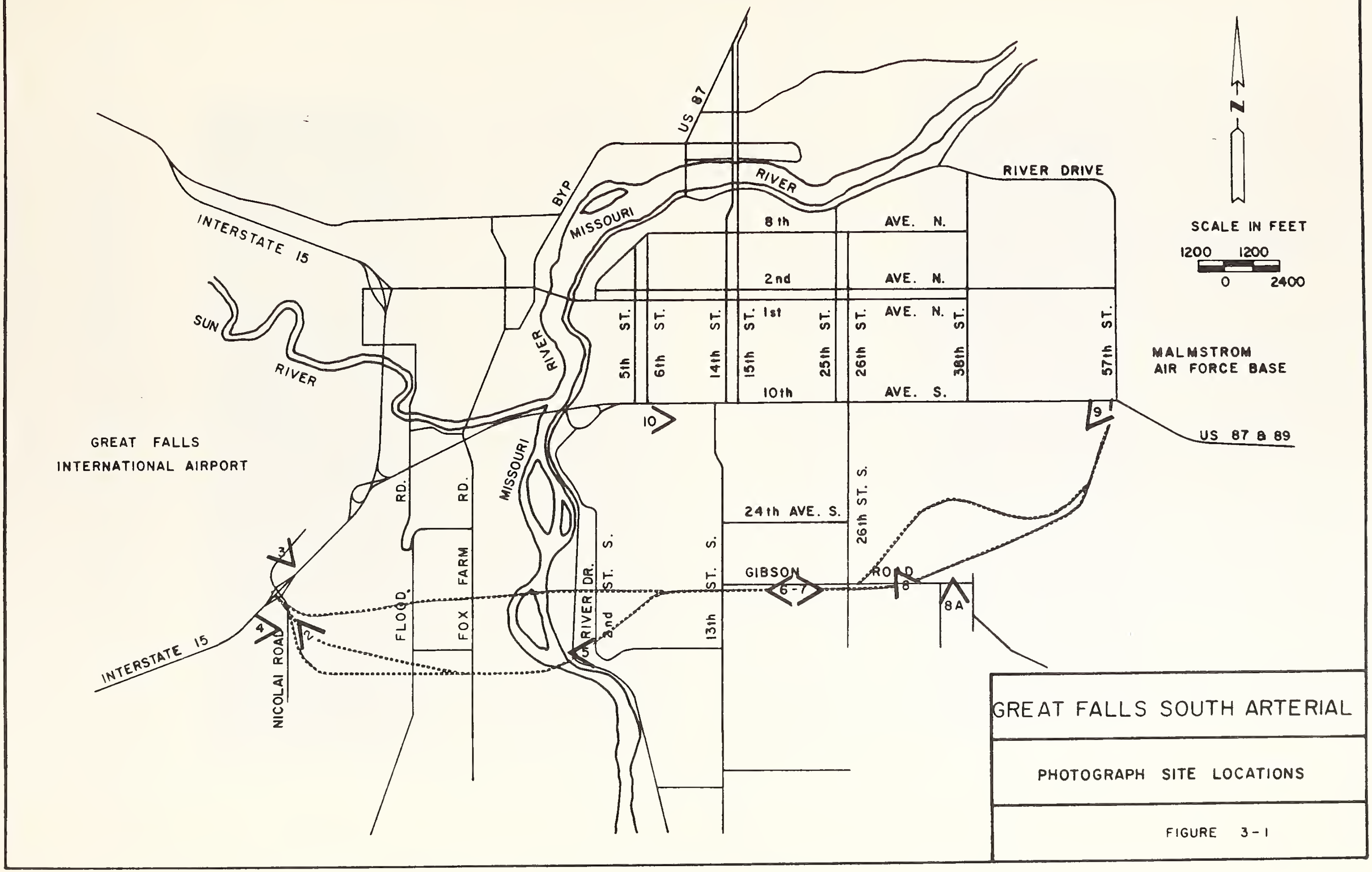
- Human Environment
  - Social & Economic Impacts;
  - Relocation Impacts;
  - Visual Impacts;
  - Noise Impacts;
  - Land Use and Zoning Impacts;
  - Historical/Cultural Site Impacts; and
  - Impacts on Section 4(f) Properties.
- Natural Environment
  - Natural Resources Impacts;
  - Wetlands Impacts;
  - Flood Hazard Impacts;
  - Stream Modification or Impoundment Impacts;
  - Air Quality Impacts; and
  - Water Quality Impacts.

Also discussed are construction impacts.

An impact/alternative comparison summary can be found on Table 3-19 at the end of this Chapter. The discussion of these impacts in this EIS is necessarily a summary of intensive investigations conducted as part of the EIS/planning study. All technical reports and supportive studies are listed in Appendix A.

In order to give the reader a better understanding of the existing south arterial corridor environment, photographs taken from various locations along the corridor are exhibited on Figures 3-2 through 3-10. Figure 3-1 identifies the photograph site locations.

GREAT FALLS - MONTANA



GREAT FALLS SOUTH ARTERIAL

PHOTOGRAPH SITE LOCATIONS

FIGURE 3-1

Figure 3-2

July 1979 - View of Gore Hill interchange on I-15 (proposed South Arterial western terminus). Looking NW towards airport.

Figure 3-3

July 1979 - View from Sun River Bench looking SE across I-15 towards Missouri River and alternate segments 4, 5, and 6.

Figure 3-4

July 1979 - View from highest elevation of proposed South Arterial on Gore Hill. Looking east onto alternate segments 4, 5, 6.

Figure 3-5

July 1979 - View of Missouri River crossing alternate segments 4 and 5. Looking west towards Fox Farm Road-South Arterial Interchange from 2nd Street South.

Figure 3-6

July 1979 - View of Gibson Road at 20th Street South looking west toward Gore Hill.

Figure 3-7

July 1979 - View of Gibson Road at 20th Street South looking east toward Gibson Flats.

Figure 3-8

July 1979 - View of Gibson Flats and alternate segments B and D looking NW from Gibson Road.

Figure 3-8A

July 1979 - View of Gibson Flats and alternate segments B and D looking north from Gibson Road toward 39th Street South.

Figure 3-9

July 1979 - View from South Arterial - 57th Street and 10th Avenue South proposed interchange looking SW toward Gibson Flats.

Figure 3-10

December 1979 - View of 10th Avenue South. Looking east toward 9th Street South.

THE HUMAN ENVIRONMENT AND RELATED IMPACTS

Social and Economic

Discussion. The quality of the existing social environment is a major determinant of the significance of an impact on that environment. The quality will have different levels of significance, although the impact magnitude may remain the same. The actual level of significance assigned will depend on the ability of the existing environment to absorb impacts without falling below a given level of quality. Thus, a small action on a highly sensitive environment may cause a greater level of significance than a larger action may cause on an environment whose tolerance to absorb adverse impacts is greater.

The effects of a project or plan on people and people's responses may be direct and immediate or remote and attentuated. Depending on the existing conditions, an impact may be minor or major. Short-term impacts are generally minor because their duration is temporary. Long-term impacts are major because they continue to exert effect over a longer period of time. Similarly, a project that impacts a larger area is likely to be major. Significance of impact is, therefore, related with time frame and the geographic area covered. Prerequisite to any rational assessment of human impacts and responses is an inventory and depiction of the revelant social environment.

Existing Environment.

History. Great Falls was named for the impressive cataracts at this spot, which marked the navigable limits of the Missouri River. Paris Gibson, a prosperous sheep rancher near Fort Benton, was a close friend of James J. Hill, founder of the Great Northern Railroad. Gibson, who was also an engineer, agreed with Hill that the Great Falls area was a logical site for a railroad terminus, and laid out a town which was incorporated in 1888 as Great Falls with Gibson as the first mayor. The next year the new town became part of a new state when Montana was admitted to the Union. Gibson had planned his town well and it grew as an attractive community with wide streets and numerous parks.

Early industrial development included a dam and hydroelectric plant at Black Eagle Falls, smelting plant, a meat packing plant and a flour mill built by Paris Gibson in 1885. Much of the growth of the city can be attributed to the construction and operation of several hydroelectric dams at the various falls of the Missouri River where power of the falling river has been put to productive use. The importance of agriculture to the growth of the area is reflected today in the large number of business houses and related facilities that are associated with agriculture and livestock raising.

The age of the buildings indicates that the early development of the city was located in the area to the east of the river and in close proximity to the business district. Early residential construction occurred in this general vicinity where employment centered in the commercial and industrial establishments. The later construction of railroad yards on the west side of the river and the smelter and mill in the vicinity of Black Eagle contributed to the expansion of these areas.

Malmstrom Air Force Base, just east of Great Falls, which was established as a bomber training base during World War II, has also played an important part in the development of the area. This air base currently serves as a control center for a vast missile complex located throughout northern and central Montana.

Great Falls is now the major city of a five-county agricultural region commonly referred to as the "Golden Triangle". It is the second largest city in Montana, providing retail, wholesale, manufacturing, education, health and financial services to nearly 250,000 people.

Population. 39,214 people lived within the Great Falls corporate limits in 1950; by 1960 there were 55,357, an increase of over forty percent. By comparison, the statewide growth rate was less than fifteen percent during the same years. The Great Falls growth rate slowed drastically during the next decade to 8.7 percent with 60,091 people counted in 1970. Census Bureau estimates show a 1976 population of 60,381 indicating very little growth since 1970. There are currently many vacant homes in Great Falls due to overbuilding in 1972-73, reduction of Air Force and Boeing personnel, and a tight money market with high interest rates.

Since 1960 Cascade County has shown higher growth rates than Great Falls - 11.4 percent from 1960 to 1970 and 3.2 percent from 1970 to 1976 - reflecting the development of suburban residential areas. This suburban growth has been mainly to the north and south and primarily consists of single-family homes on large lots, leading to low population densities. There has been commercial development throughout the suburban area, but recent concentration has been along 10th Avenue South.

Information was provided by the Great Falls Building Department on the following recent construction projects south of 10th Avenue South:

- 50 units of subsidized multi-family housing are being constructed by the Great Falls Housing Authority, 30 units just south of Deaconess Hospital at 26th Street and 16th Avenue South, and 20 units in the Charles Russell Addition at 11th Avenue South and South 33rd Street.
- A new dental clinic complex and Safeway store have been completed in the area south of 10th Avenue South.
- The Holiday Village Shopping Center, located on 10th Avenue South and already the largest center in the state, is undergoing remodeling with talk of a second story.

Local planners prepared a special population projection for the "1976 Great Falls Urban Transportation Study." The transportation study area, which extends beyond the city limits, had a 1971 population of 72,600 which by 1975 had increased 4.8 percent, to 76,076. Projections for the area to the year 2020 are shown in Table 3-1.

Table 3-1

PROJECTED POPULATION

Year	Population
1980	79,956
1990	88,321
2000	97,562
2010	107,766
2020	119,025

Source: Great Falls City-County Planning Board

Real estate speculation within the project area supports the contention that one of the significant future growth areas of Great Falls will be southwest of the City.

Economy. The Great Falls area economy has historically been based on agriculture and livestock and resource-related manufacturing. During World War II, the Great Falls Air Force Base, later renamed Malmstrom Air Force Base, was established, adding the element of defense activities. Attitudes that developed over the years somewhat inhibited industrial expansion; it was felt that such endeavors would only encroach upon the area's highly valued recreational resources and scenic beauty.

Two events, both occurring in 1972, significantly changed local sentiments and opened the door for subsequent adoption of programs and policies that would not only attract new industry to the area, but would initiate long-overdue areawide master planning of land use. The overall decline of the nation's economy, precipitated in part by the energy crisis, plus the closure of the Anaconda Company's zinc reduction operations and curtailment of anti-ballistic missile (ABM) construction at Great Falls, created not only a high local unemployment rate, but also caused many skilled workers to look for employment out of the area.

In 1972 an Overall Economic Development Plan (OEDP) was formulated by a citizens committee which not only cited problem areas that required immediate attention, but put forth positive steps necessary to restore the area's economic health.

Local government has actively supported an orderly industrial, commercial, and residential growth program in recent years. Various agencies of the city, such as the Great Falls Chamber of Commerce and the Economic Development Corporation of Great Falls, have initiated broad programs to attract new industries to the area and to encourage the expansion of existing ones.

Agriculture and livestock continue to be a dominant force in the area's economy. The region is particularly noted for its high production of quality wheat and barley. Two-thirds of Montana's grain is marketed by firms located in Great Falls. Each year, larger numbers of cattle remain for finishing on locally produced grains instead of being shipped to the Midwest, thus providing the basis for a new and important industry (feedlots) and expanded meat-packing operations. The area also is becoming well known for registered high-quality breeding stock. Some of the finest Charolais, Simmental, Hereford, and Angus herds are raised around Great Falls.

The Anaconda Company is the area's largest manufacturing employer. The Company's sprawling 500-acre site along the Missouri River north of the city contains the Great Falls Refinery, a part of the Montana mining division and the adjacent rod mills, a part of the wire and cable division. The city is also known as a center for the storage, processing, and marketing of grain and feed products with General Mills and Con-Agra of Montana as the second and third largest manufacturing employers.

As a petroleum center, the city is growing too. The Phillips Petroleum Company has a refinery north of the city, just west of the Anaconda facility, that processes an average of 6,200 barrels of crude oil per day. The area from Great Falls north to the Canadian border yields more than half the state's total petroleum output. Great Falls is also the terminal and gathering point for the Yellowstone pipeline.

Tourism is having a growing impact on the Great Falls economy. The city is favorably located in an area of plains, mountains, lakes, rivers, streams, and forests and offers a multitude of attractive recreational and resort facilities. Great Falls is situated midway between Glacier and Yellowstone national parks, and visitors to either of these well-known attractions usually include Great Falls in their itinerary.

A factor in the area's economic development for the past 30 years, Malmstrom Air Force Base is the nerve center of the nation's first Minuteman missile defense complex and headquarters for the 341st Strategic Missile Wing and the 24th Air Division of the Air Defense Command (NORAD). In addition to providing employment for nearly 800 civilians, this military installation is manned by over 6,000 military personnel. In 1977 the base's impact on the local economy amounted to nearly $162 million. Recently, however, 1000 jobs were phased out at Malmstrom Air Force Base.

The Montana Air National Guard also is headquartered at Great Falls. Located adjacent to the airport on Gore Hill, MANG employs over 350 full-time civilian and military technicians plus about 1000 active Air Guard members from throughout the state who train at Great Falls.

The labor force in Cascade County numbered 24,184 in 1960 and 32,804 in 1970, an increase of 36 percent. At the same time, the Great Falls labor force increased 24 percent, from 19,452 in 1960 to 24,183 in 1970. The Cascade County labor force for the month of September for the past three years was as follows:

September 1977 -- 34,800
September 1978 -- 36,800 -- 11% increase over 1977
September 1979 -- 35,600 -- 3% decrease from 1978

Employment estimates for the transportation study area show a 10 percent employment increase from 1970 (30,000) to 1977 (33,000).

Employment categories for Cascade County, August 1979, are as follows:

Agriculture	1,800
Manufacturing	2,000
Construction	2,100
Transportation and Public Utilities	2,200
Wholesale trade	2,800
Retail	8,000
Finance, insurance, and real estate	2,100
Services and mining	6,600
Federal government	2,000
State and local government	3,900
Total Employed	33,500

Unemployment for August was 6 percent, which is identical to the national average for the same month.

The changes that have taken place in the Great Falls economy are reflected in changes in employment from 1971 to 1976. Employment in manufacturing decreased and employment in transportation and utilities remained stable. Employment in wholesale/retail trade, construction, finance, insurance and real estate, and in services increased substantially. Federal government employment stayed relatively stable but employment by state and local government increased.

Housing. Most of Great Falls's neighborhoods are homogeneous in nature, and all are within a 15-minute drive of the downtown area. The majority of new residential development can be found in the northwest section and along the city's eastern and southern boundaries. Residential areas in the southwest section offer a wide selection of especially prestigious homes situated on lots ranging in size from one-third acre to one acre.

Homes on five and ten acre parcels are found outside the city limits to the southwest. Many are situated on gently rolling hills that offer commanding views of the city and river.

Property values have been appreciating over the past several years at 14 percent per year. This appreciation has recently slowed down nationally due to high interest rates and difficulty in obtaining financing. A local effect in the Great Falls area is the high availability of housing, which has resulted from decelerated military programs, employee layoffs, and out-migration.

Funding Sources for Transportation Facilities. The Great Falls Transportation Plan Financial Resource Analysis (Great Falls City-County Planning Board, 1979) identifies potential funding sources which could be used to implement recommended transportation improvements. Potential funding sources for new road construction include Federal-Aid Primary and Urban System funds, Revenue Sharing funds, Gas Tax funds, the City General Fund, the city's portion of Motor Vehicle License fees, bonds, County Road and Bridge taxes, creation of City and/or County Improvement Districts, County Motor Fuel Excise Tax, and other less significant sources.

The report concludes, "Though some of the City's resources already contribute to transportation facilities, i.e., Revenue Sharing and Gas Tax, they do not provide an adequate amount of funding for major reconstruction of existing facilities or construction of new facilities. The County's resources are strained to provide for just the maintenance of the county roadways and thus funds for reconstruction or new construction are not available. Although a County excise tax on fuel would provide substantial new funding, it is unlikely it would receive voter approval in light of the national tendency toward tax reform.

"At this time, local officials and the public apparently feel that major transportation improvements should be totally funded through available Federal-Aid and State matching funds. Of course, it's quite possible that continued public dissatisfaction with portions of the transportation system may pressure local government officials to use a greater portion of revenues for transportation improvements. Unfortunately, discussions with City officials revealed that revenues are not keeping pace with inflation and thus the amount which might be available for transportation improvements is probably decreasing year by year."

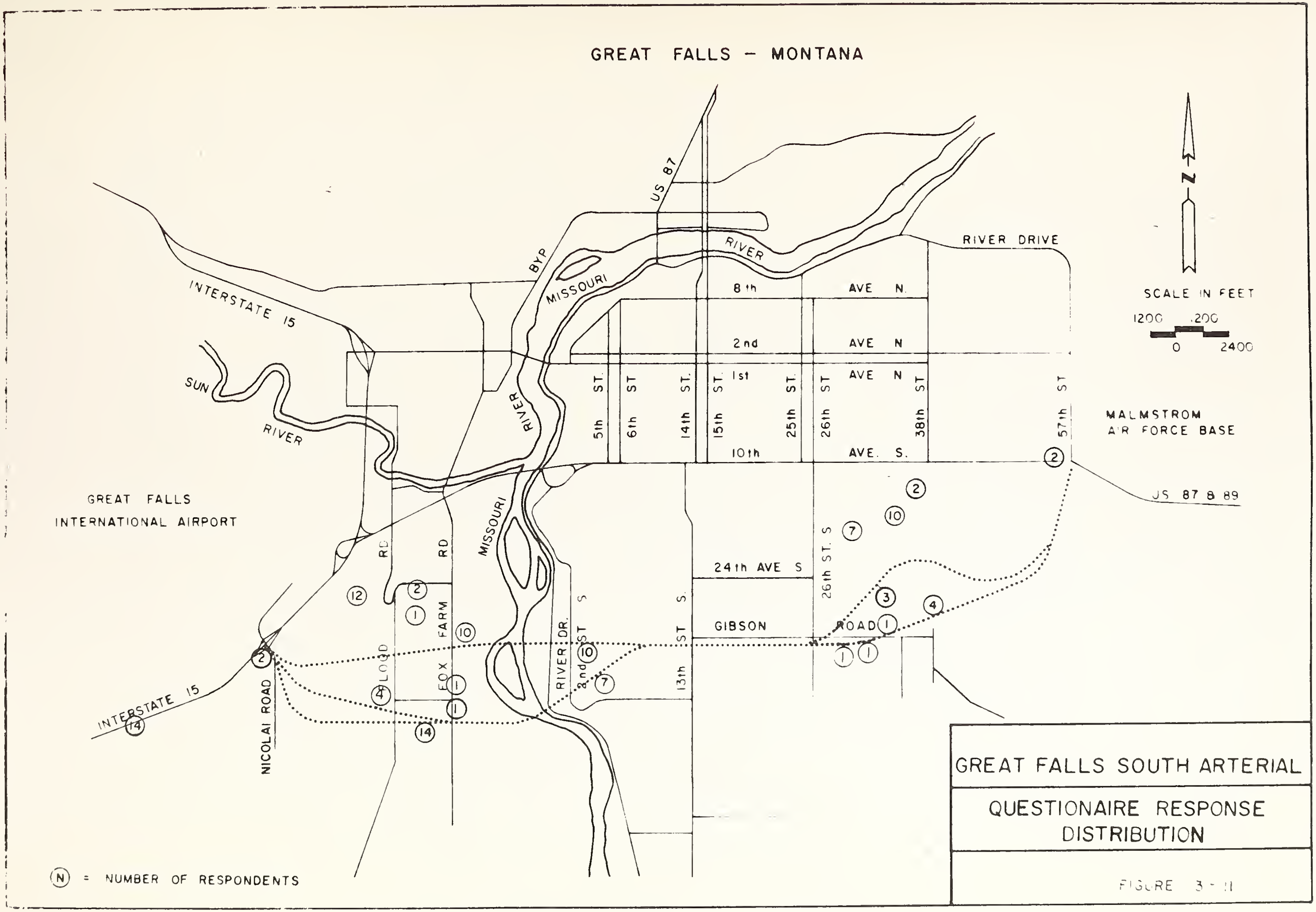
The proposed south arterial is part of the Great Falls Federal-Aid Urban System. The current annual allocation for the Urban System in Great Falls is approximately $1,070,000. This includes Federal and State contributions.

South Arterial Project Area. In an attempt to assess the potential personal socio-economic impacts to individuals within the project area, a comprehensive socio-economic profile of these individuals was developed. Important parameters considered were tenure, individual age, income level and racial or ethnic origin. Real impacts to the livelihood of the elderly, school-age children, the poor, the handicapped or to the minorities would have greater significance than perceived aesthetic impacts of the well-to-do.

A questionnaire was prepared and 500 copies were distributed throughout the proposed arterial corridor to determine the family and community profile of the impacted area. These postage-paid questionnnaires were also distributed in residential and commercial areas proximate to the western and eastern project terminus. The Great Falls public library carried 100 copies and they were available at a well publicized public meeting. One hundred thirty questionnaires (26 percent) were filled out and returned. Figure 3-11 shows the number and locality of respondents (those that gave addresses). Most live within the study area. One library copy was returned, indicating either poor exposure or lack of interest on the part of those not potentially impacted by the project.

Social characteristics were analyzed for the responding sample and extrapolated to the community level for the project area. The social profile characteristics which are particularly relevant to measuring the impact of the proposed action, at least on the respondents, are as follows:

- The majority live in single-family residences;
- Very few senior citizens or minorities are represented;
- About half the households have children younger than 19 years old living at home;



GREAT FALLS SOUTH ARTERIAL

QUESTIONAIRE RESPONSE DISTRIBUTION

FIGURE 3-11

- 45 percent of the respondents are employed;
- Over 90 percent of the respondents own automobiles and drive to work. Over 50 percent drive more than 5 miles;
- Less than 5 percent have annual family incomes under $10,000. 60 percent have incomes over $20,000 per year;
- Average land tenure of respondents is 5 years; and
- Over 98 percent own their own homes. Over 90 percent of the property values are estimated to be more than $50,000.

More than 50 percent of the respondents were aware of a proposed South Arterial and many thought it would disrupt their neighborhood (56 percent). Traffic congestion in Great Falls frequently impacted at least 36 percent of the respondents. Forty-four percent said they would frequently use the proposed south arterial. Assessed effects of the south arterial were more positive than negative with respect to activities, access to community facilities, and urban growth. The more negative responses were due to environmental impacts of aesthetics and noise. No discernable group opinion of personal lifestyle or community impacts by each alternative could be discerned from the questionnaire responses. The average number of motor vehicles per family is 2.7; one on the average was a truck.

The general social profile which emerges from the questionnaires is that the project area respondents are young to middle-aged, relatively prosperous, and fairly mobile. The current suburban residential character, or the lack of local business and shopping districts, in the region south of Great Falls suggests that many activity centers are located outside the neighborhood. The location of other community facilities, i.e., schools, hospitals, and community centers, supports the conclusion that residents are fairly dependent upon vehicular movement. Much of this mobility dependency is the result of the area's relatively recent development.

Education facilities available to project area residents include three elementary schools. Junior high and high school education is available via busing to Great Falls public school facilities. School enrollments in Great Falls have been declining in recent years. Other community facilities available in the project area include two designated parklands and a designated school site. Parklands will be discussed in the section titled "Impacts on Section 4(f) Properties." Rural fire and law enforcement protection is provided by contract and the County Sheriff respectively.

There are several private utility lines within the project area including Montana Power Company electrical transmission lines, Mountain Bell telephone lines, Yellowstone Pipeline Company transmission lines, and Great Falls Gas Company transmission lines. Two proposed public utility lines are planned within the project area in local long-range utility improvement plans. A sanitary sewer and storm sewer are proposed for the area.

Impacts.

General Impacts. The proposed project will create both positive and negative impacts to the Great Falls community.

Key benefits of the project are:

- improved transportation and safety;
- reduced traffic congestion;
- improved accessibility and convenience;
- improved 10th Avenue South air quality;
- increased development potential;
- improved economic base;
- improved fire and police protection to the southern areas;
- creation of a scenic highway; and
- planned and orderly development

Adverse effects of the project are:

- loss of agricultural land, open space and recreational value;
- loss of wetlands, vegetation and wildlife habitat;
- displacement of residences;
- increased noise and air pollution emissions in southerly areas;
- personal aesthetic impacts; and
- decreased property values in several residential areas.

The proposed south arterial will undoubtedly induce some population growth. Commercial development will result in employment opportunities which are long-term in nature whereas actual construction will create short-term employment.

It is anticipated that construction of the south arterial would be staged over a period of ten to twenty years. Construction manpower and time estimates are given in Table 3-2. The construction periods listed in this Table are not additive because of difficulties in projecting actual construction schedules.

Table 3-2
Great Falls South Arterial Construction
for Total Facility

Item	Manpower	Construction Period
Grading	30	20-24 months
Paving	30	12-24 months
Missouri River bridge construction	25-30	24-30 months
Interchange structures (each)	15-20	10-12 months

Source: HKM Associates

Economic Impacts. Measurement of economic impact may be as simple as estimating the change in income in an area, or as complicated as determining the change in the underlying economic structure and distribution of income. Generally, effects may be examined for impact on conditions of income and employment. Any activity that results in some input or output relationship with a local business or individual has an impact on the growth and stability of the regional economy. Direct purchases would have an effect, as would indirect purchases through payrolls.

The proposed south arterial should contribute to the well-being of the local and regional economies. The facility will lower vehicle oeprating costs, reduce travel time for east-west traffic movement and should lower accident rates. It will cause short range construction related business and employment.

The number of people in Great Falls has remained fairly stable over the past few years but their location is changing as many are migrating from the central city to outlying areas such as the southwest. Economic returns to the community resulting from induced growth from this proposed transportation facility will include increased property taxes and income taxes.

Necessary acquisition of residences and agricultural land for right-of-way will result in tax losses and decreased property values in some environmentally impacted areas. However, the majority of property values will rise due to the increased accessability, leading to higher tax assessments and property tax revenue for the city and county. Property is appraised by market value according to location, size, school district, and construction material. The city-county assessors office advised that property values would be expected to increase with the construction of a south arterial; however, some properties either severely visually or audibly impacted might have de-valuations.

Transportation links are to business what the blood vessels are to the heart. In Great Falls, currently a stable community, the economic issue is more critical than it would be in a growing community; therefore, transportation links take on an added importance. All major urban areas are experiencing decentralization of retail sales, and Great Falls is no exception to this trend. This decentralization of sales is evidenced by the data available now, and the completion of the Westwood Mall shopping center in northwest Great Falls will increase the degree of decentralization in the near future. The Mall will undoubtedly attract shoppers away from all retail centers in the city and the CBD can expect to experience a decline in its sales activity.

The viability of the CBD, both as a center for retail sales and for the service industry, will be strengthened by a new transportation facility along the proposed route. A decrease in traffic may cause an increase in the relative importance of 10th Avenue South and the CBD retail sales. A new facility will remove some of the non-buying through traffic from local business streets. Traffic entering the business district to shop or to transact other business will be more easily accommodated. Improved accessibility, then, may help to forestall the further decentralization of retail sales that has occurred in the northern Great Falls area.

The manpower resource requirements will positively impact the employees and the community due to the financial resources gained. The number of required employees will not be enough to negatively create an impact to other employers or to cause secondary housing and public facility utilization impacts. Manpower requirements will largely be satisfied by local employees.

Most community facilities will be positively impacted by the south arterial due to improved access which will also enhance civil defense and fire and police protection to residents in the south Great Falls region. The south arterial could be a significant segment of the defense highway system as its western terminus is close to the Montana National Guard facilities and the Great Falls airport while the eastern terminus is within one mile of the entrance to Malmstrom Air Force Base. This transportation facility would not be as susceptible to blockage by civilian traffic during emergencies as would 10th Avenue South.

One facility which would be negatively impacted by alternate segments 4 and 5 is the County Junked Vehicle Graveyard, which is located one half mile west of 13th Street and one-and-one-half miles south of Great Falls.

No disruption to religious or health facilities will result from the proposed project. School buses traverse the length of the project on a daily basis. The increased safety and ease of travel afforded by the project will be of considerable benefit to them.

Project Financing Impacts. Completion of the projects recommended in the 1979-1983 Transportation Improvement Program (TIP) will result in a negative urban system fund balance of approximately $4,628,000. Therefore, unless future allocations of Urban Systems funds increase or other funding sources become available, it is unlikely that construction of the south arterial can be completed by the year 2000.

While funds for early construction of the south arterial are limited, early acquisition of right-of-way is desirable. This would protect against the public's future expenditure for escalating property values. Subsequent leasing of properties not needed for immediate construction can provide a return to the project, further reducing the ultimate costs of right-of-way.

Funding advances are available for right-of-way acquisition through the Federal Highway Administration. 23 U.S.C. 108(c) and Public Law 90-495 make provision for establishing a revolving fund to provide advances to states for acquisition of rights-of-way for future construction of highways. The funds are also available for making payments for moving costs or relocation of persons, businesses, farms, and other existing uses of real property caused by acquisition of such rights-of-way on a federal aid project, including relocation of utilities. Funds may be advanced to the state without interest and may be used to pay the entire costs of right-of-way projects. These advances generally must be paid back within ten years. Actual construction of a highway for which funds are advanced is not allowed to be commenced within two years, but must begin in less than ten years following the end of the fiscal year in which the advances are approved. The use of the funds is predicated upon availability and request by the State Highway Department.

It appears unlikely that additional federal funds will be available for the construction of the south arterial or portions of the facility. If local revenues are raised to aid facility construction there will be a tax burden on property owners for many years. Considering the projected costs of facility implementation it is doubtful whether the local governments will wish to incur that large a debt.

Project Area Impacts. The relationship between the general characteristics of the south arterial project area and the impact of the proposed action can be measured following guidelines developed by Marshall, Kaplan, Gans, and Kahn in "Social Characteristics of Neighborhoods and Indicators of the Effects of Highway Improvements" (1972). A major conclusion of that report was that the "residents of low density, suburban type neighborhoods, in which pedestrian dependency is low, and activity locations outside the neighborhood, have a high degree of tolerance for a freeway. In contrast, high-density, pedestrian-dependent neighborhoods, with low levels of automobile availability, strong racial and/or ethnic ties, and neighborhood-centered activities, are not socially feasible for a freeway." Neighborhoods in the proposed south arterial corridor resemble the former type to a great degree. Marshall et al. report that more prosperous neighborhoods typically rank lowest in social integration. However, seventy-seven percent of the questionnaire respondents knew their neighbors. Considering an average tenure of 5 years, this might indicate the existence of tighter community cohesion than anticipated which would increase the adverse effects of physical neighborhood disruption.

A significant variable determining social effects of highway construction projects identified by Marshall et al. (1972) is the degree of physical impact on the neighborhood resulting from the action. It was concluded in the report that "a freeway located at the border of a neighborhood is not likely to result in a decline in neighborhood qualitative indices. If, however, the freeway right-of-way segments or divides the original neighborhood, the residential mobility can be expected to increase significantly and socio-economic level and qualitative indices can be expected to decline."

Restriction of movement and activity flow is a major concern with respect to creating a physical barrier in the form of a limited access arterial. Residents south of the proposed arterial would be separated from existing community facilities such as schools and hospitals. However, because of strategically placed overpasses and underpasses which will permit north-south movement, and the availability of the arterial itself, access to these institutions will not be adversely affected. The net impact will be greater ease of access for automobile commuting residents. Proposed bikeways will facilitate, and actually improve bicycle movements. The Community Facility Plan 1974 Update considers future facilities for the year 1990 in Great Falls. These developments will further serve to reduce the isolation of the south-lying communities. The proposed facility will improve law enforcement coverage and fire protection service due to reduced response times and better access to the area.

All of the proposed alternate routes bisect one or more officially platted subdivisions. Alternate route segments 4 and 5 traverse Ranchos Grande Vista, Rolling Hills Estates, and the Pearson Addition. Alternate segment 6 divides Ranchos Grande Vista, abuts Grande Vista, and bisects the McClean Garden Tracts. Both B and D cross the platted land in the Eaton Addition east of the Missouri River. Lot sizes vary but average about 5 acres in most of these areas. While most of the land has been sold to private individuals, many owners have not yet built their dwellings. Thus, while the proposed arterial corridor does intersect with residential neighborhoods and would negatively impact their physical cohesiveness, the effects are somewhat mitigated by the low-density nature of these suburbs.

The proposed project will result in relocation of between 3 and 64 residences, depending on the alternative alignments chosen. These residences range from large, expensive one-of-a-kind owner-built view homes to older style mobile homes. Relocation housing should not have an adverse impact on the housing market in Great Falls due to the time frame over which relocation and right-of-way acquisition will occur. Relocation impacts will be discussed in greater detail in the next section of this Chapter.

The construction of the south arterial will cause relocation of some utilities and will impact their future locations. This impact is minor and could be accomplished with a minimum amount of service interruption to the public. A Great Falls storm and sanitary sewerage improvements master plan was developed in 1972 and is generally compatible with all of the south arterial alternatives.

The U.S. Coast Guard pointed out that any structures over the Missouri River should provide adequate clearance to allow the passage of typical vessels operating in this reach of the River. Recreational boating is the main source of navigational use of the Missouri River in the project area as the Great Falls of the Missouri make commercial navigation impractical. Bridge clearances are well above the 100 year flood elevation and pier spacing will be approximately 200 feet. The proposed crossing structures of all south arterial alternatives will have no significant impact on recreational boating on the Missouri River.

Parks and recreation areas, which are discussed in greater detail in the 4(f) properties evaluation section, are impacted indirectly as a result of the facility bisecting the landscape. The open farmland represents a recreation resource to the local residents. The proposed arterial will be designed to include several sections of bikeway which will promote recreation.

The project will strengthen ties between neighborhoods, providing access and communication and retaining or improving social interaction patterns. The project will help support projected community development and economic growth.

Secondary Impacts. Improved accessibility to 10th Avenue South and the Great Falls central business district will help to maintain its role as a community focal point and viable regional shopping center. This opportunity, however, is tied to its ability to compete with other types of commercial development, specifically private shopping centers that may locate in the southern Great Falls area to serve the rapidly expanding residential development in the area. New business would increase employment opportunities.

Increased revenues would result from new and increased property taxes in the area. Secondary economic benefits from the project would include "spin-off" effects such as local and regional purchases related to construction materials and manpower expenditures. The impact on the local economy will be minor. One potential adverse secondary economic impact might be the diversion of federal-aid urban system funds from another transportation project.

Socio-economic Impacts of the "No Action" Alternative. The "no action" alternative will do nothing to solve the existing and projected traffic and operational problems on 10th Avenue South and other arterials in the area. Expected increases in vehicles will further increase the traffic operational problems and associated social, economic and environmental impacts such as noise and air pollution.

The "no action" alternative might be more costly when considering or assigning a dollar value to the time and energy resources lost in traffic congestion and by the dollar volume of business lost in the adjacent areas due to shoppers' unwillingness to put up with the congestion. Failure to take steps to meet the projected transportation needs now will likely result in more costly solutions in the future which will have greater impacts on the area.

Relocation Impacts

Existing Environment. The residential character in the south arterial corridor area west of the Missouri River can be summarized as fairly modern single family residences constructed within the last five years. East of the Missouri, developed areas in the corridor are generally more established. Most of the residents are acquainted with their neighbors and would be disrupted if required to relocate. They exhibit a fair degree of mobility as evidenced by their desire to reside away from community facilities and conveniences. The suburban neighborhood environment is presently not impacted by any major transportation facilities.

Impacts. Displacement from one's home is probably the most severe social effect resulting from an implemented project. The no action alternative would not require any relocations. However, some relocations would be required with any of the south arterial facility alternatives. These are shown on Figure 3-12.

The actual number of residential relocations required is variable depending upon the specific alignment segment and total route configuration. The necessary commercial relocations are also variable dependent, not only on the chosen alignment, but also on the type of interchange implemented at the eastern route termini. Table 3-3 lists the various required relocations according to the specific alternate route segments.

Table 3-3
RESIDENCES AND BUSINESSES DISPLACED BY
SOUTH ARTERIAL ALTERNATE ROUTE SEGMENTS

Alternate Segment	Residential Displacements	Commercial Displacements	Other Buildings
4	3	0	1
5	2	0	1
6	61	4	12
B	2	2	1
D	2	2	0

Source: Montana Department of Highways.

Alternate segment 4 will require the relocation of two residences in the Gore Hill area west of the Missouri River and one residence at the intersection of 13th Street South and Gibson Road. Alternate Segment 5 would require the relocation of one residence in the Gore Hill area in addition to the residence at 13th Street South and Gibson Road.

The most serious relocation impacts would occur under alternate segment 6. This alternate would require the relocation of two residences in the Gore Hill Area and 59 residences and four businesses east of the Missouri River. The alignment would cross the site of the Rivershore Mobile Home Court creating adverse impacts on two levels: the owner relative to her business investment, and the individuals currently renting space at the court. The Rivershore Mobile Home Park has 49 pads and a manager's residence. Vacancies are uncommon as rental pads are $60 to $80 per month. The owner estimated a cost of $4,000 per pad to set up a new

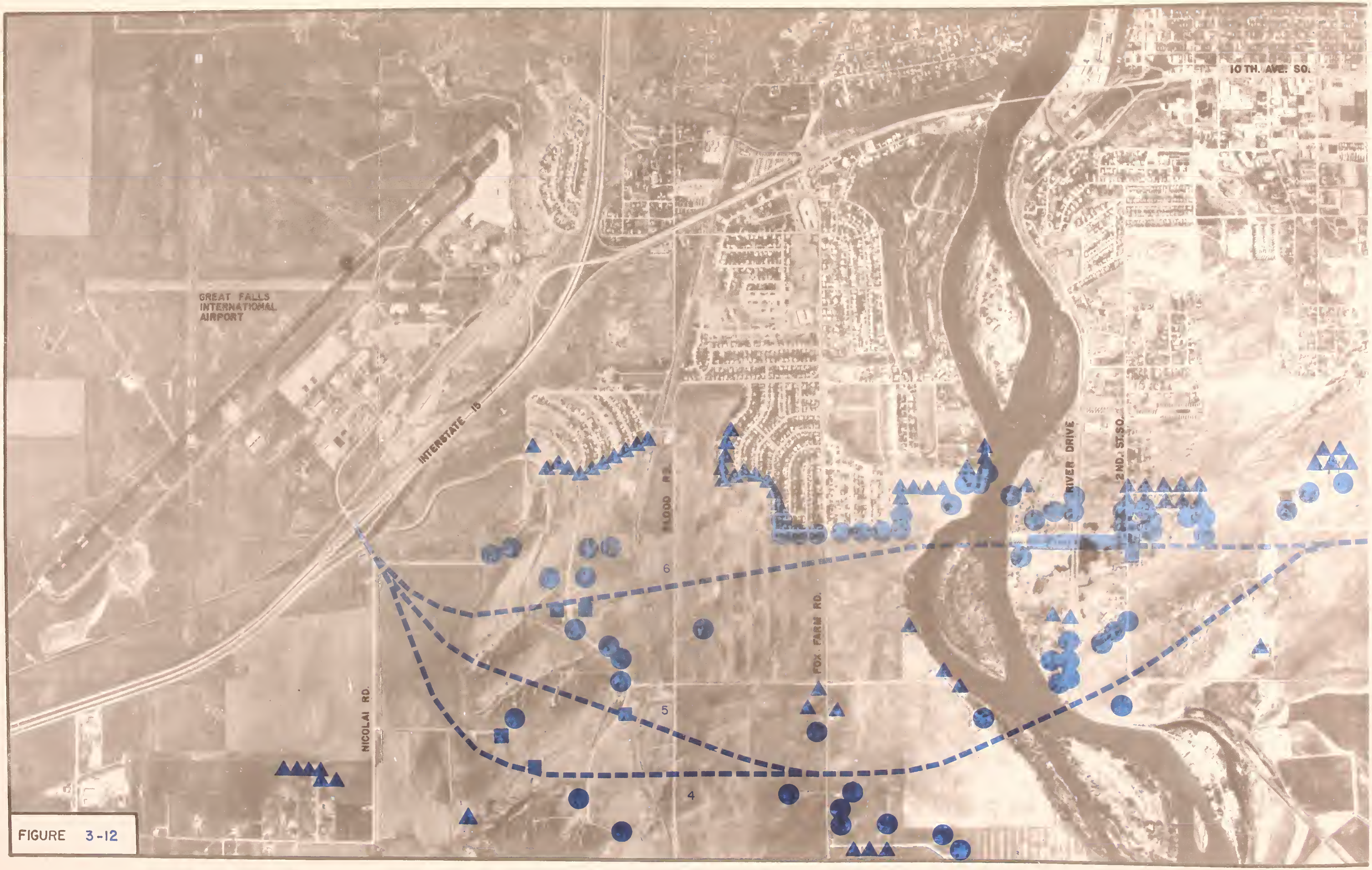
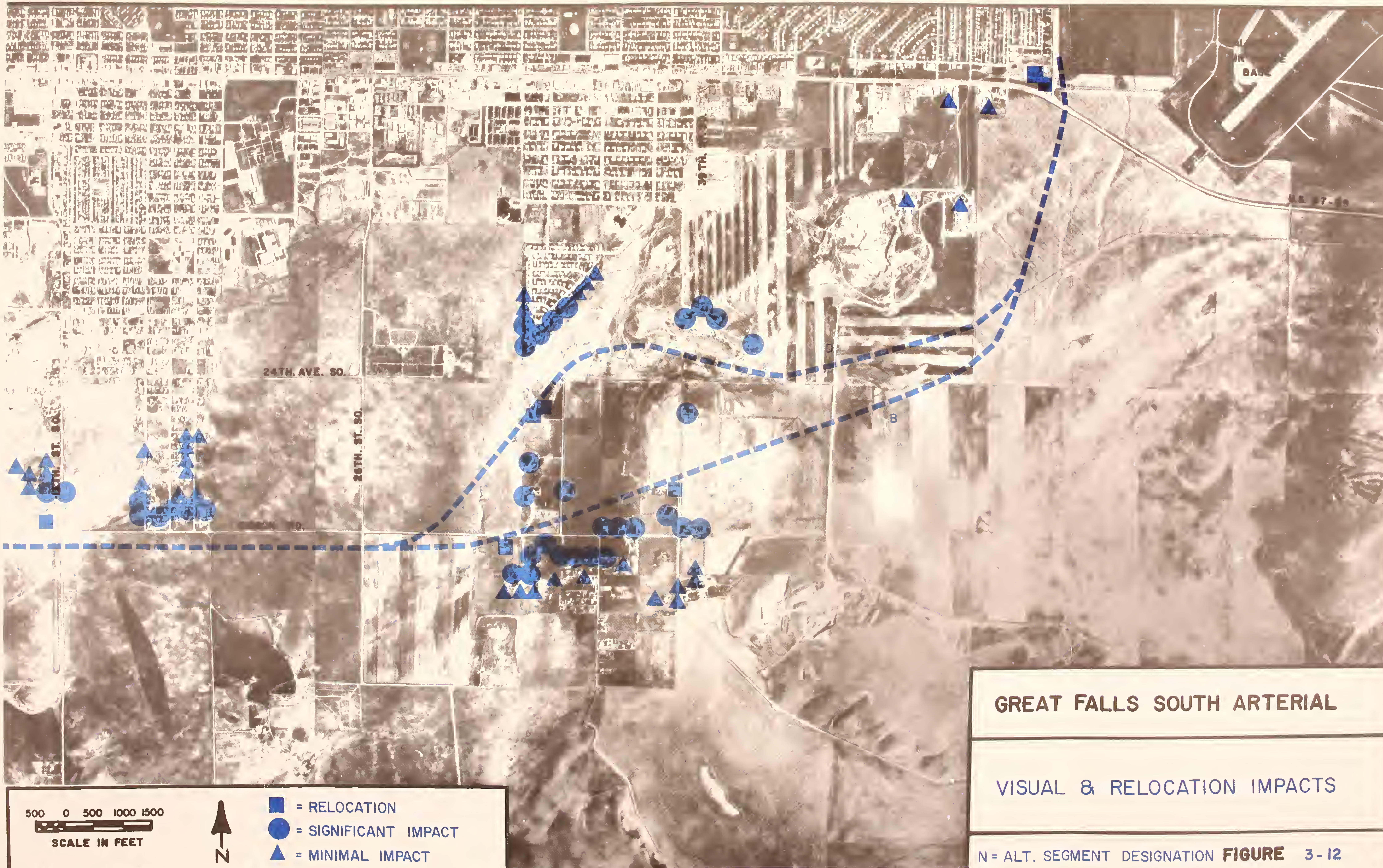

10 TH. AVE. SO.
GREAT FALLS
INTERNATIONAL
AIRPORT
INTERSTATE 15
BLOOD RD.
FOX FARM RD.
NICOLAI RD.
RIVER DRIVE
2ND. ST. SO.
6
5
4

FIGURE 3-12



GREAT FALLS SOUTH ARTERIAL

VISUAL & RELOCATION IMPACTS

FIGURE 3-12

court. Two minority people reside in the mobile home park who would have to be relocated to another court along with other residents.

Other businesses to be displaced by Alternate Segment 6 include a crystal shop, masonary shop and a welding shop. Another resident would be impacted in this area due to relocation and an economic loss of his six rental units. In addition, his tenants would be impacted by relocation.

One business west of the Missouri River which would be impacted by alternate segments 4, 5, and 6 is a gas station/rental car agency located at the western terminus of the project on Gore Hill. Relocation is not anticipated and future impacts to this business should be positive.

Alternate segment B will require relocation of two residences in the Gibson Flats area and two businesses at the intersection of 10th Avenue South and 57th Street. Alternate segment D will also displace the two businesses as well as two residences in Gibson Flats. One of the businesses is an auto body shop/used car lot. It is an established business that relocated here in 1978 from another area of Great Falls. Over 70 percent of their business comes from the highway and Air Force Base so that relocating any distance would have an adverse impact on business. The other business facing relocation is a reconditioning shop that cleans cars and engines. It would be impacted if required to relocate more than a short distance from 10th Avenue South. Vacant property west of this shop, as well as other parcels nearby, are available for relocation. Long term positive impacts should result to these businesses if relocation occurs within a short distance of the existing sites.

Table 3-4 summarizes the required relocations of the composite south arterial alternatives and of the "no action" alternatives.

Table 3-4
RESIDENTIAL AND COMMERCIAL DISPLACEMENTS
OF THE ALTERNATIVES

Alignment	Residential Displacements	Commercial Displacements
4B	5	2
4D	5	2
5B	4	2
5D	4	2
6B	63	6
6D	63	6
No Action	0	0

Source: Montana Department of Highways

As can be seen from Table 3-4 alternate segments 6B and 6D require the most displacements while alignments 5B and 5D require the fewest. Of course the no action alternative would not require any relocation impacts but would also not satisfy any of the identified transportation needs. If a south arterial right-of-way is not defined or acquired in the near future, the relocation impacts of such a future facility will be greater as development continues south of Great Falls.

Mitigation Measures. All persons or businesses displaced by this project will be eligible for relocation assistance. Relocation payments would be provided for moving expenses, housing supplements when indicated, and certain miscellaneous expenses. This will be done in accordance with The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Housing availability in the Great Falls area is currently very good due to the housing boom of the early 70's, the recent wrapup of the Boeing Missile Project, and the Norad and Malmstrom military base layoffs. By the time relocation proceedings would be started, this situation could change. High housing availability reduces relocation impacts because it increases housing selection and location.

Sufficient mobile home rental spaces are available in three existing mobile home parks to accommodate displaced mobile home occupants. Many of the residences to be displaced are relatively new owner-built homes. Consequently there is little replacement housing of a similar kind available. Many are located in low-density developments adjacent to areas with suitable space for building. Local realtors implied that there is currently land available in the general vicinity for building replacement homes. One possible negative effect is that displaced residents will have to relocate slightly farther out of town because growth has and is proceeding from the city limits southward. Land availability in the area at least lessens the adverse impacts associated with long distance moves and allows displaced residents to remain in the proximate area. Children would not have to change schools, and families would not be separated from friends and neighbors to a great degree. With sufficient available housing, land, and mobile home courts in the Great Falls area, it does not appear that it would be necessary to rely on last resort housing.

The businesses to be displaced are small and can be relocated with business moving payments. There are vacant buildings and properties in the Great Falls area to take care of them. If the Rivershore Mobile Home Park cannot be suitably relocated where their patronage will remain the same the owners should be compensated in lieu of moving expenses.

Visual Impacts

Existing Environment. The south arterial project area is primarily an agricultural area interspersed with residential and commercial development. The Missouri River bisects the south arterial corridor. The topography varies from flat to rugged terrain with the Sun River Bench (Gore Hill) rising over 350 feet above the river valley to the west. Generally, undisturbed vistas can be viewed to the southwest, south and southeast. The City of Great Falls lies directly to the north of the project.

Several areas bisected by the south arterial route alignments have recently experienced residential subdivision. Other areas were subdivided in past years and are presently occupied. Clustered development has occurred where the south arterial crosses the Missouri River and at the western end of Gibson Flats. From the low level of Gibson Flats the City of Great Falls is hidden by the bluff to the north and conversely the lower area of Gibson Flats is hidden from the view of most of Great Falls. Photographs of the south arterial corridor are found on Figures 3-2 through 3-10.

Impacts. Visual impacts of a south arterial facility would vary with the particular route alignment and with the person or persons perceiving the visual impact. Impacts were assessed as a function of distance from either side of a specific alignment proposal. For purposes of this study the critical distance was established at 1000 feet. Residents within that distance from an alignment edge were projected to experience serious or significant visual impacts. Those residents greater than 1000 feet from an alignment or shielded from the facility by other structures were projected to experience minimal or less significant visual impacts. Figure 3-12 identifies visually impacted properties. Table 3-5 quantifies significant visual impacts by alternative route segments.

Table 3-5
RESIDENCES SIGNIFICANTLY
IMPACTED BY SOUTH ARTERIAL ALTERNATIVES

Alternative Segment	Number of Seriously Impacted Residences
4	72
5	73
6	114
B	62
D	31

Source: Brown & Caldwell

By combining the route segments, it can be seen that alternative alignment 6-B impacts the greatest number of residences. This reflects the close proximity of alternative segment 6 to the residentially developed area west of the City. Alternative segment B impacts the scattered developments within the western end of Gibson Flats. Alternative alignments 4D and 5D impact the least number of residences, primarily because alternative segments 4 and 5 are located further from the more heavily developed areas and alternate segment D bypasses the majority of the Gibson Flats development.

Visual impacts will be experienced on both a temporary and a long-term basis. During the construction phase of the project visual impacts will be experienced due to the increased particulate air contamination, the large equipment operations, disturbed land areas, structural siting apparatus and materials stock piles. These impacts will abate when the project is complete.

Alternate segments 4, 5 and 6 will create significant long-term visual impacts to residents living in close proximity to the proposed alignments. New residential development immediately north of Alternate Segment 6 would have the greatest concentration of those visually impacted. Residents living further away will view the project as a break in the topography. Residents living near the Fox Farm Road-South Arterial junction will be visually impacted by the proposed diamond interchange and overpass. Fox Farm Road will be constructed over the South Arterial.

The overall length of the structure for the Missouri River crossing by alternate segments 4 and 5 (including the railroad crossing) is 1,730 feet. Alternate segment 6 will require a structure about 1,600 feet in length. An additional structure 275 feet in length will be required to cross River Drive and the Burlington Railroad tracks. These structures will be visible from more existing residences than the single structure proposed for alternate segments 4 and 5.

The south arterial will cross over 2nd Street South. Visual impacts will be attributed to the roadway and its two associated structures; the Missouri River bridge and 2nd Street South overpass. Access to 13th Street South is at the same location for all alternate segments, directly south of Gibson Road. A diamond interchange is anticipated here with 13th Street South passing over the south arterial. Visual impacts would not be significant in this area as residential development is sparse.

Residents in the Gibson Flats area would be visually impacted by either alternate segment B or D; however, alternate segment B would be the most significant. The access location of the south arterial from Gibson Flats would be an extension of 39th Street South which would connect with the project alignments. This new 39th Street South extension would pass under a south arterial overpass and connect with Gibson Road. Visual impacts of the overpass structure would be greater to residents for alternate segment B than D.

Upon completion of the project, the right-of-way corridor will be landscaped to be compatible with the surrounding landscape. This will primarily consist of grading and appropriate revegetation. Arterial intersections will be treated in greater detail to lessen the stark impacts of the interchange structures.

The "no action" alternative would not offer any short or long term visual impacts. Uninterrupted vistas may not, though, be ample justification for the action to those would-be users of a south arterial facility. The visual impact of a project is difficult to evaluate because it is a matter of individual preference. A constructed feature may have an adverse impact on a preservationist but may be very attractive to people being served by the facility.

Noise

Describing the Noise Environment. It is appropriate to define a noise environment using a measure or "descriptor", the magnitude of which relates to the adverse impacts of the noise on human activities. Many years of research have resulted in the use of A-weighted noise levels. Essentially, the A-weighting de-emphasizes the low frequency components of a noise and simulates the hearing characteristics of the human ear.

Because the noise of most environments changes with time, it is customary to average the noise level for a given time period. The equivalent noise level, symbolized L_{eq}, provides a noise average which is heavily influenced by the higher noise levels which are experienced. This is appropriate since these higher levels are usually what determine the seriousness of the noise impact. All noise levels presented in this report are therefore A-weighted equivalent noise levels and will be symbolized as L_{eq} in decibels (dB).

The South Great Falls Noise Environment. The area through which the proposed south Arterial will pass is primarly undeveloped open space except in the vicinity of the Missouri River, the Gibson Flats area, and a few bordering residential developments. For the most part it is a fairly quiet area except where streets or arterials pass through it (such as Fox Farm Road, River Drive, 13th Street, Gibson Road, etc.) and occasional aircraft flyovers, power boat traffic on the Missouri River, and some industrial noise in the Gibson Flats area.

Noise measurements were made at 17 locations in the study area during the time period 9-12 July, 1979. Measurement locations, shown on Figure 3-13, were selected to be representative of the total range of noise exposure experienced in the study corridor, from remote areas distant from any noise source to adjacent heavily traveled arterials. Measured daytime noise levels in decibels ranged from the high 30's to the mid 60's, depending on the proximity of the measurement location to a noise source. The range of measured L_{eq} are shown in Table 3-6.

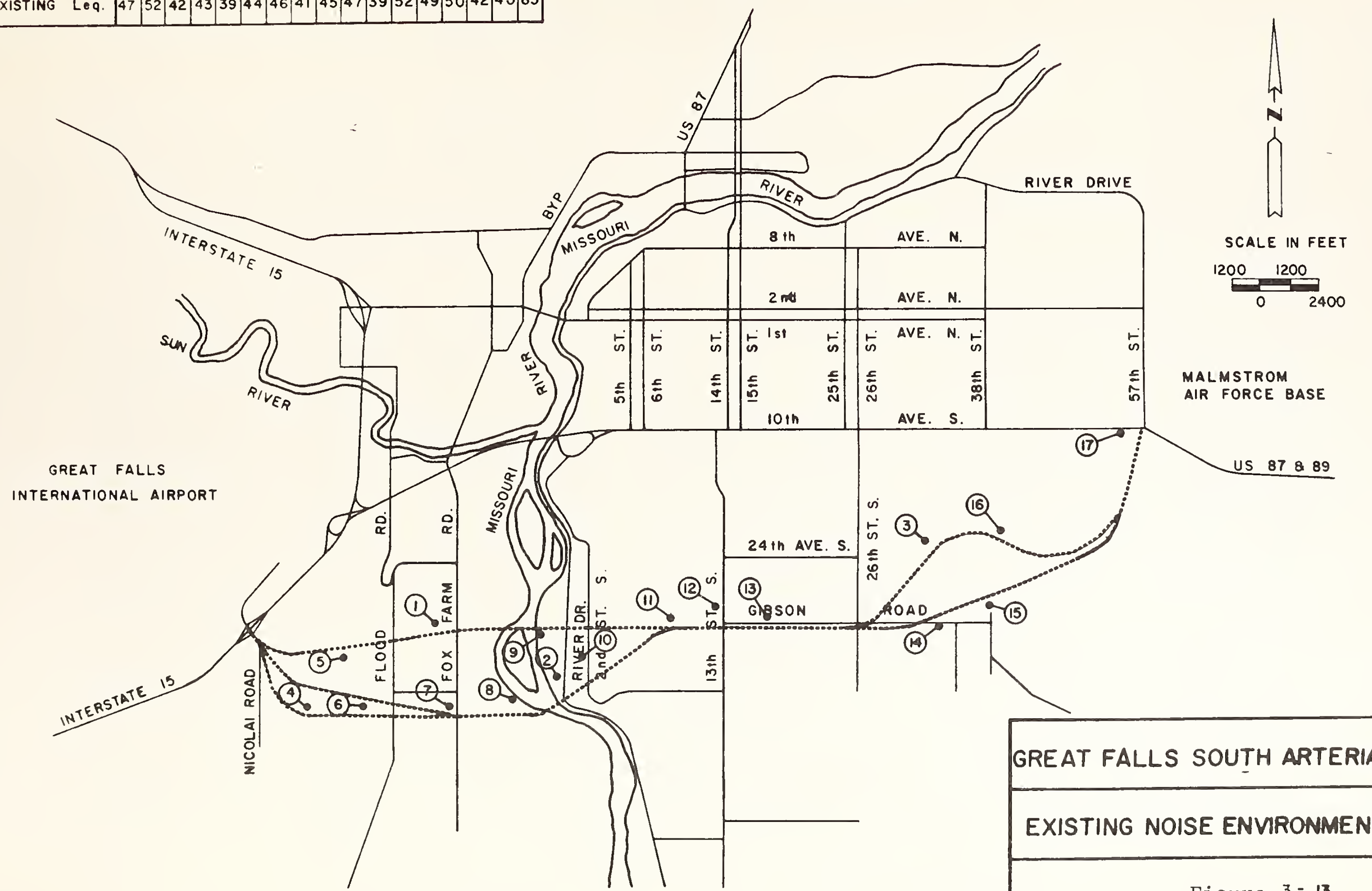
Table 3-6
EXISTING NOISE LEVELS

Location	Range of Measured L_{eq}, dB	Average L_{eq}, dB
Undeveloped or edge of developed area, far from arterial	38 - 42	40
Developed, some local traffic	42 - 47	45
close to an arterial	47 - 52	50
Close to 10th Avenue South	60 - 65	63

Source: Towne, Richards & Chaudiere

Momentary maximum levels from noisy events will produce higher levels, while lower levels would occur during the early morning hours when traffic and other activities are at a minimum.

SITE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
EXISTING Leq.	47	52	42	43	39	44	46	41	45	47	39	52	49	50	42	40	63



GREAT FALLS SOUTH ARTERIAL

EXISTING NOISE ENVIRONMENT

Figure 3- 13

Noise Prediction Methodology. Noise level predictions were prepared for the study area using a computer program based on the methodology described in the FHWA Report RD-77-108, FHWA Highway Traffic Noise Prediction Model, 1978. The methodology is based upon three parameters - traffic conditions, roadway geometry and observer characteristics.

The predictions were based on the year 2000 directional design hour volumes for the AM and PM peak traffic volume hours. The design hour traffic was assumed to be 10 percent of the Average Daily Traffic (ADT) with a 60/40 directional split. The noise model incorporates three classes of vehicles: automobiles, medium trucks and heavy trucks. The medium truck volume was assumed to be 3 percent of the total volume while heavy trucks were assumed to be 2 percent. The observer position was located 5 feet above the ground.

To depict the predicted noise levels along the south arterial, contours of equal noise level were chosen. Since traffic projections for alternate segments B and D are relatively independent of alternate segments 4, 5 and 6, the noise impacts can be more easily discussed in terms of these alternate segments. Alternate segments 4, 5, and 6 extend from I-15 to 26th Street South and alternate segments B and D extend from 26th Street South to 57th Street.

The "no action" alternative would require the existing streets, with some upgrading, to carry the increased traffic in the year 2000. With this increased traffic will come higher noise levels in the proportion of 3 dB for each doubling of the traffic volume and thus 6 dB for quadrupling the volume. Table 3-7 contains a list of the major arterials, their existing ADT, their year 2000 ADT for "no action" and the predicted increase in noise level due to the traffic volume increase. The Table also contains the major arterials Design Year ADT for alternate segments 4, 5, 6, B and D, as well as the predicted increase over the existing noise level.

Noise Evaluation Standards and Guidelines. There is existing residential land use around the proposed south arterial and it is anticipated that much of the area around the arterial will be developed as residential. As a result, it is necessary to evaluate the adverse impact that the predicted traffic noise will have on the residents and their activities. Two criteria are used to evaluate this impact - the FHWA Noise Control Standard and the EPA Guideline for Permissible Increases.

The FHWA Noise Control Standard (23 CFR Part 772) imposes maximum permissible L_{eq} noise levels for specified land uses and traffic conditions. A summary of these design levels is shown in Table 1 of the Standard. The residential areas will be subject to activity category "B" design noise level L_{eq} of 67.

The EPA has established guidelines (April, 1973) for assessing the impact of an increase in noise levels. Most people will tolerate a small increase in background noise level (up to about 5 dB) without complaint, particularly if the increase is gradual over a period of years (such as from gradually increasing traffic volumes). Increases greater than 5 dB may cause complaints, particularly if the increased

Table 3-7
NOISE INCREASE ALONG MAJOR ARTERIALS

Street	Exist.	Daily Traffic No Action	4 & 5	6	Noise Increase, dB No Action	4 & 5	6
Flood Road	595	6,995	2,799	3,251	11	7	7
Fox Farm Road n. of project	2,728	8,751	6,846	12,321	5	4	7
Fox Farm Road s. of project	2,728	8,751	12,570	13,194	5	7	7
2nd St. So. n. of project*	430-1,462	1,920-9,978	10,928	13,063	6-8	9-14	10
2nd St. So. s. of project	430	1,920	778	2,415	6	3	7
13th St. So. n. of project	3,566	6,175	10,534	11,494	2	5	5
13th St. So. s. of project	3,821	6,367	5,014	5,852	2	1	2
10th Ave. So. e. of 9th So.	24,332	37,381	18,886	16,964	2	-1	-2
			B	D		B	D
26th St. So. n. of project	2,244	4,450	6,776	5,011	3	5	3
39th St. So. n. of project	0	0	1,792	4,541	0	-	-
39th St. So. s. of project	0	0	1,002	271	0	-	-
10th Ave. So. w. of 57th So.	10,631	15,931	8,257	8,835	2	-1	-1
10th Ave. So. e. of 57th So.	5,491	8,705	8,699	8,699	2	2	2
57th Street So. n. of project	7,994	11,923	13,904	12,409	2	2	2
10th Ave. So. e. of 26th So.	33,154	42,304	30,130	29,677	1	0	0

Note: *Traffic volumes varied north of the project within the range stated.
Source: Towne, Richards & Chaudiere

levels are causing interference with speech or sleep. Increases above about 10 dB (corresponding to a doubling of judged loudness) are likely to cause complaints and should be regarded as a serious condition. The increase criteria are summarized below:

Up to 5 dB	Minimum Impact
5 to 10 dB	Significant Impact
Greater than 10 dB	Serious impact

Noise Impacts. Examination of predicted noise level contours shows that none of the south arterial alternatives produce noise levels which exceed the FHWA standard of 67 dB beyond the right-of-way (R/W). Therefore, there is no requirement for noise abatement measures. However, a comparison of predicted noise levels and existing levels shows some serious impacts where an increase of more than 10 dB occurs.

In some of the areas near the right-of-way where the predicted noise levels range between 60 and 65 dB the increase over the existing in undeveloped areas (20-25), developed areas (15-20) and areas close to an arterial (10-15) will exceed 10 dB resulting in a serious impact. Where the predicted noise levels are between 55 and 60, only in the undeveloped areas (15-20 increase) and the developed areas with some local traffic (10-15 increase) will there be serious impact. At the locations further away from the arterial or in the vicinity of a depressed section where the predicted levels are 55 dB, only the undeveloped areas with an increase of 15 dB will experience a serious impact.

Since alternate segment 6 carries more traffic than alternate segment 4 or 5, the predicted noise levels along alternate segment 6 are somewhat higher than those of alternate segment 4 where both have a similar configuration, such as elevated sections. Since alternate segment 6 passes through more developed areas than do 4 or 5, it is not likely to produce quite as many increases greater than 15-20 as would the other alternates which go through more undeveloped areas with their lower noise levels. However, alternate segment 6 will adversely affect more people since it travels through more populated areas than do the other alternates.

If a south arterial alternative is implemented, it will probably be built in phases as the south Great Falls area becomes more populated. Areas that are presently undeveloped with low noise levels may become developed by the time the south arterial would be built, reducing somewhat the impacts resulting from noise increases.

A comparison of the noise increases along the major arterials for all the alternates shows that alternate segments 4 and 5 produce lower noise increases than the No Action alternative for slightly more than half of the arterials while alternate segment 6 produces lower noise increases than the No Action alternative for slightly less than half the arterials. The noise increases for alternate segment D are about the same as for the No Action alternative except for 10th Avenue South, which is lower the "no action" alternative only along 26th Street South, the rest being the same except for 10th Avenue South which is lower.

There are expected to be some noise impacts during construction. These impacts and methods which will be employed to minimize the impacts are discussed in the section titled "Construction Impacts".

Land Use and Zoning

Existing and Projected Land Use and Zoning. The corporate limits of Great Falls encompass 10,415 acres which includes 3,100 acres for streets and 500 vacant acres. Public parks occupy 700 acres within the city. Public buildings occupy another 15 acres and include the community civic center, city hall, the courthouse, and fire stations. Public and private schools from the elementary to college level occupy another 300 acres.

5,000 acres are used for residential purposes. The city has zoned more land for commercial and industrial uses than is being used for those purposes. There are 300 acres zoned for commercial use of which only 100 acres are being used commercially and the remainder is in residential use. The city has zoned 400 acres for industrial land use but only 100 acres are actually in use for this purpose with the remainder in commercial and residential use.

1970 land use and projected 1990 land use from the 1970 Great Falls Area Comprehensive Plan are shown on Figures 3-14 and 3-15. Growth in southern Great Falls is anticipated with large increases in single and multi-family residential land use. The area south of the Sun River and 10th Avenue South is projected to have a population increase from 11,000 in 1969 to 38,000 by the year 1990 and land use acreage as shown in Table 3-8.

Table 3-8
LAND USE IN SOUTH GREAT FALLS

Type of Use	1969 acres	1990 acres
Single-family residential	960	2,066
Multi-family residential	27	449
Commercial	184	318
Public	2,062	3,826
Park and Recreation	203	233
Industrial	753	778

Source: 1970 Great Falls Area Comprehensive Plan

The existing land use outside the city limits and within the south arterial project area is shown on Figure 3-16. Five major types of land use are depicted, with agricultural or vacant land dominating. Existing zoning in the area is featured on Figure 3-17, with agricultural and residential. For the most part, existing land use conforms to county use dominating zoning regulations.

Changes involving transportation systems often induce changes in the pattern of land use and create compatibility problems with adjacent uses. To decrease these land use conflicts, early planning and orderly controlled development are essential. The 1970 Comprehensive Plan described a proposed southside bypass road in its Transportation Plan and Land Use Plan. This bypass road was somewhat north of the current

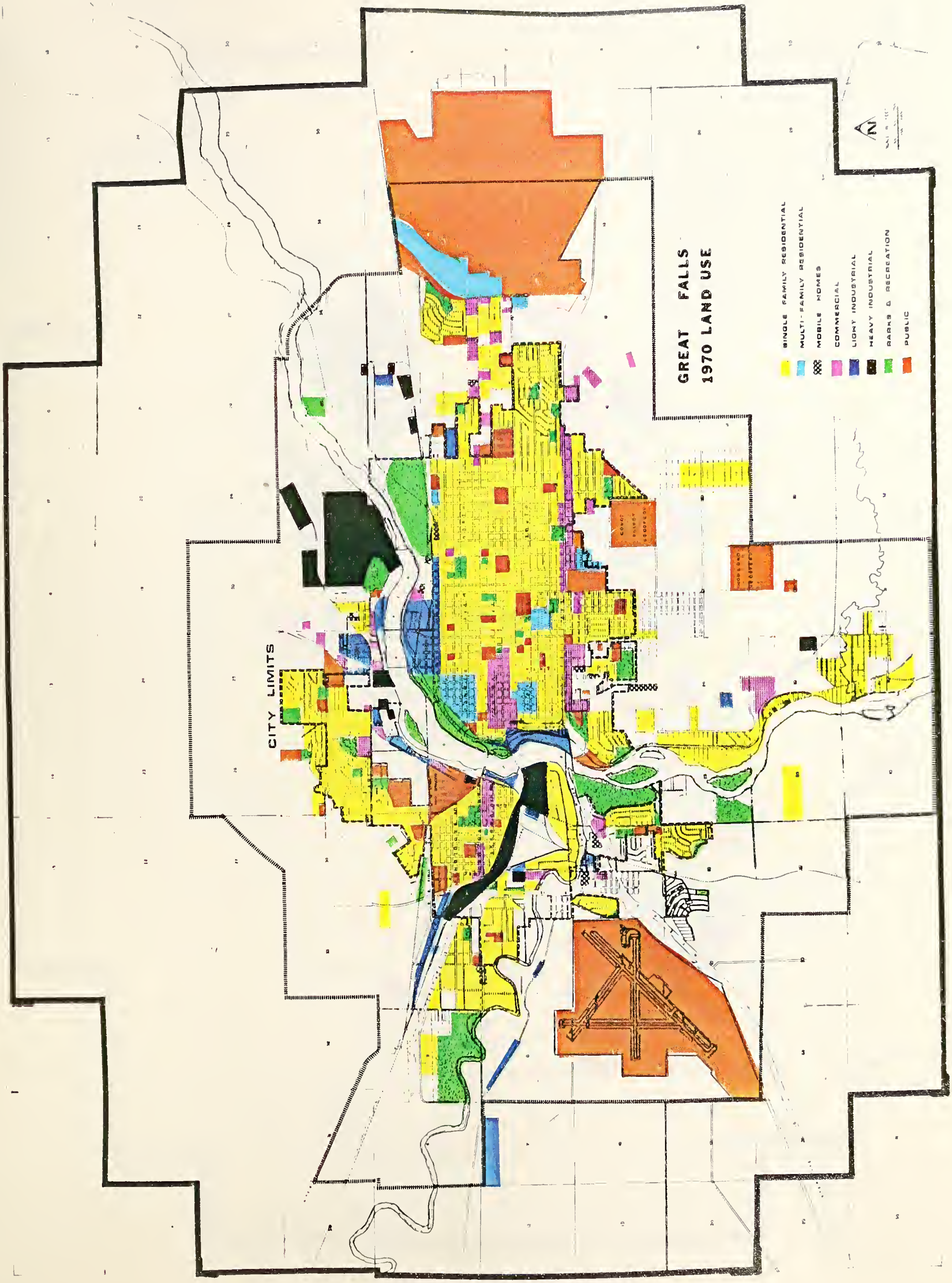
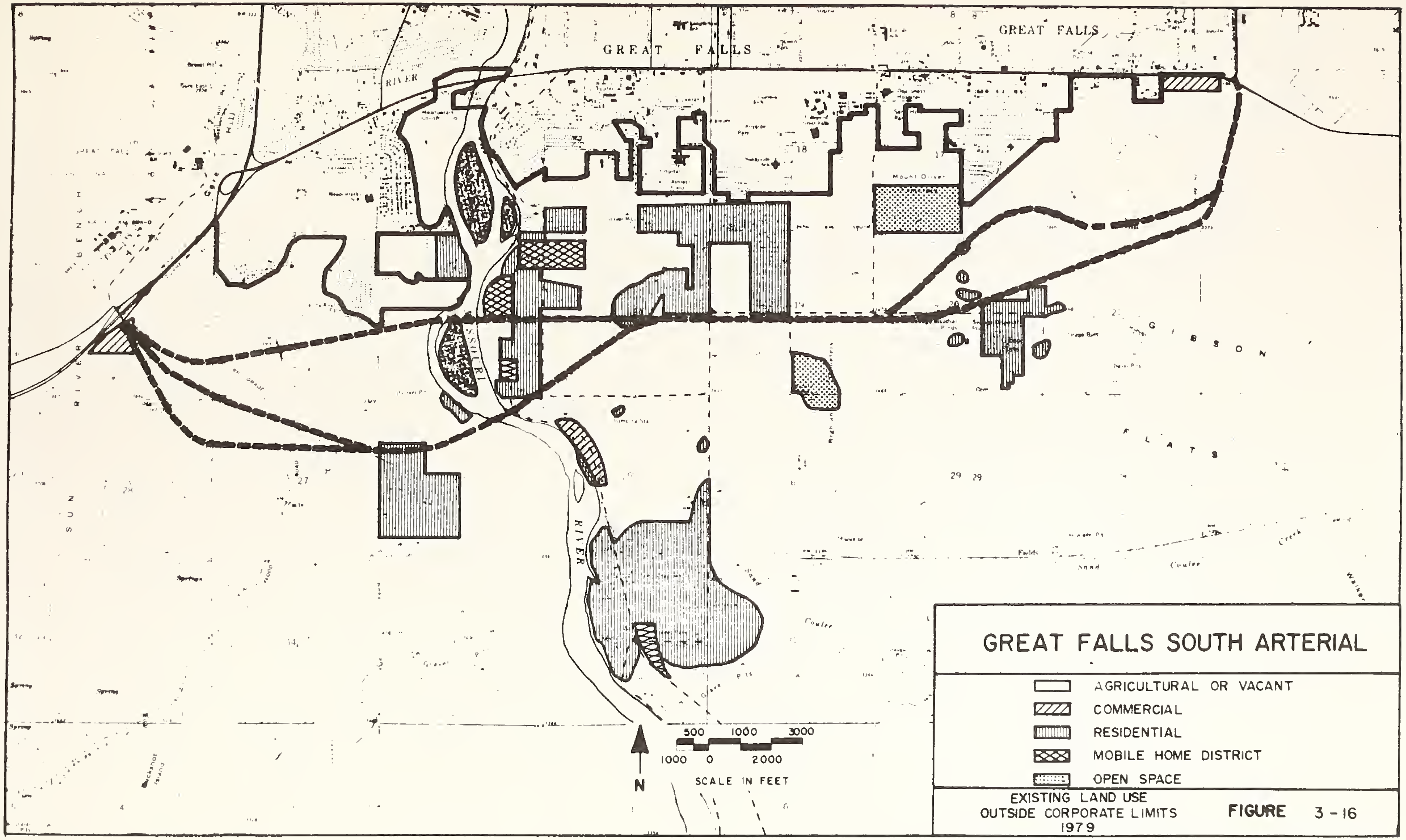
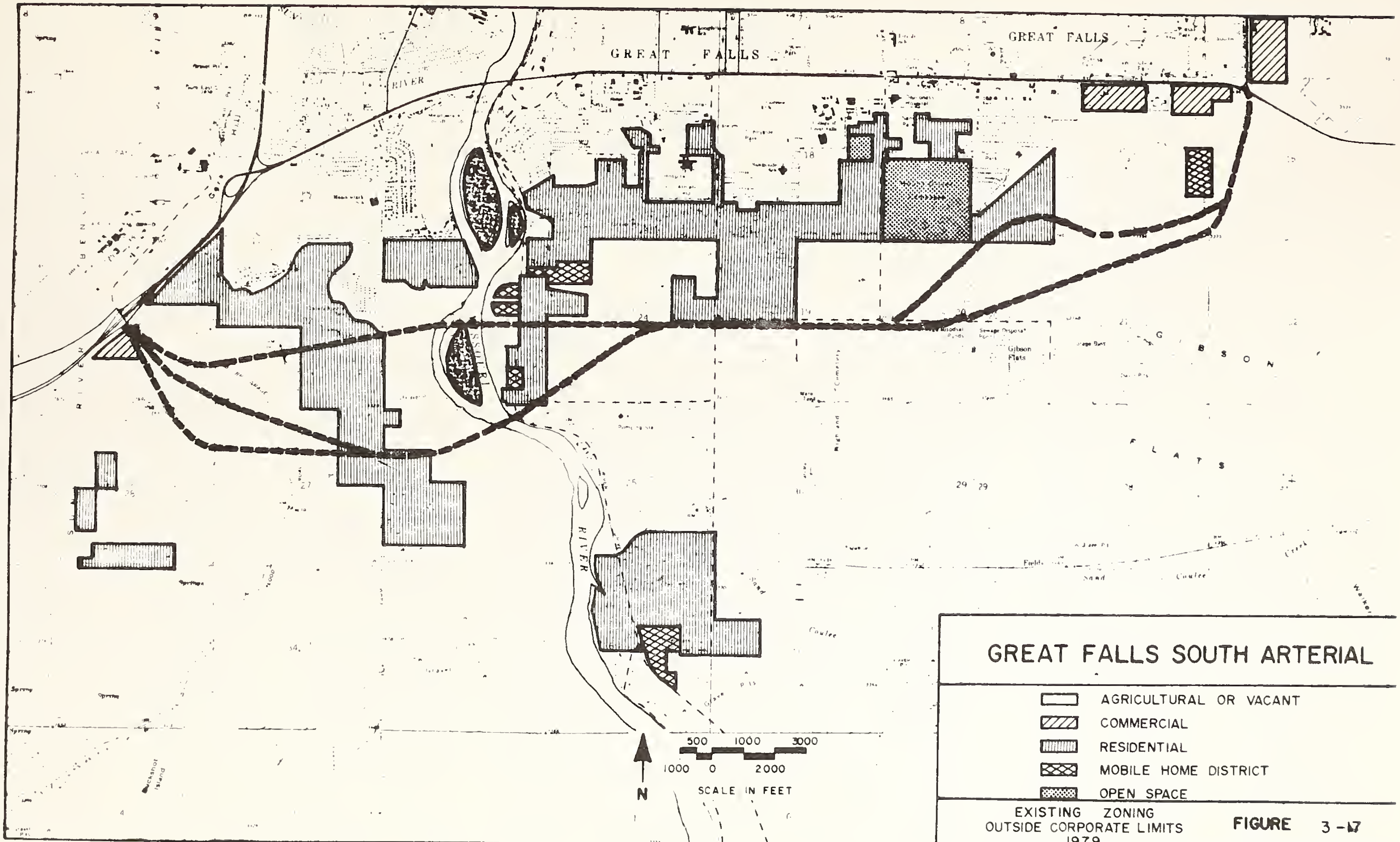

GREAT FALLS
1970 LAND USE
SINGLE FAMILY RESIDENTIAL
MULTI-FAMILY RESIDENTIAL
MOBILE HOMES
COMMERCIAL
LIGHT INDUSTRIAL
HEAVY INDUSTRIAL
PARKS & RECREATION
PUBLIC
CITY LIMITS
N

Figure 3-14



AS PROVIDED BY CITY-COUNTY PLANNING BOARD NOV. 1979



AS PROVIDED BY CITY-COUNTY PLANNING BOARD NOV. 1979

proposed south arterial. The 1970 Comprehensive Plan states that residential development would be partially guided by the location of this bypass. A high rate of suburban development was expected to occur with commercial development anticipated at major north-south arterial-bypass intersections.

Existing land use and zoning have therefore been influenced by the 1970 Comprehensive Plan. However, due to the undefined south arterial alignment, residential development has occurred at random and conflicts with the proposed alternative alignments exist at several locations. Even more land development might have occurred with annexation into the city had it not been for the inability of the city to fulfill water and sewer requirements.

Impacts. Land use impacts resulting from construction of a south arterial are of long-term significance. Some areas will be more seriously impacted than others, such as existing residences, wetlands, and cropped agricultural land. The proposed action will not have as significant an impact on existing zoning or land use as it might have, had it not been considered in the 1970 Comprehensive Plan.

Alternate alignment 4-D utilizes the greatest amount of land, 493 acres. Alternate segments 4 and B impact the largest amount of agricultural land currently in use. Due to poor reclamation suitability such as permeability, salinity/alkalinity, water erodibility, or rock and gravel, alternative segments 5 and B may actually impact the greatest amount of usable agricultural land. One farmer currently farms a majority of the agricultural land impacted by alternate segments 4, 5 and 6. He stated that the soil on Gore Hill is shallow and sandy while the lands down in the Fox Farm area are excellent. He currently grows wheat and barley and may plant some sod. Only two families farm extensively in the Gibson Flats area. One mentioned that bad water quality problems affecting several areas of their land have curtailed their ability to farm them. One landowner in Gibson Flats does not farm his land, but has a small herd of cattle. Each alternative bisects several sections of farmland, making access roads necessary.

If parcels of agricultural land are severed, they might be less farmable from an economic standpoint. Not only might some of these "remainder" units be lost to agricultural production, but development pressures might make them prime candidates for residential or commercial development. The farmland that would be acquired is an economic resource as well as a natural resource. There are no prime and unique farmlands located in the project area.

Residential land use is adversely impacted by alternate segment 6 where it crosses between River Drive and 2nd Street South as many houses and mobile homes are located in this area. Alternate segments 4, 5 and 6 impact rivershore wetlands areas of the Missouri River, while alternate segment D negatively impacts wetland areas below the bluff on the north edge of Gibson Flats.

Commercial land will be impacted at the eastern and western termini of the project. The only existing official parkland directly impacted by the project would be where alternate segment 6 crosses Taylor Island. This alternate would also cross land on the west bank of the River which is planned for park development.

The proposed roadway is not expected to substantially change future land use plans. Patterns of land use, such as commercial development, will undoubtedly evolve around this proposed transportation facility. However, some of the problems connected with development along 10th Avenue South will be avoided with access control on the South Arterial.

There is a major conflict with future plans between alternate segment 6 and proposed park development of Taylor Island and the proposed river frontage park (state owned) immediately to the west (Lot 6, Section 23, T20N, R3E).

Alternate segment 6 will adversely impact two tracts of land now set aside for public use. One tract is owned by the Great Falls public school system for a school site and contiguous thereto is another tract reserved for park purposes. The use of the school site must be coordinated with park development in conformance with state laws prescribing the ratio of school buildings capacity to land contiguously available for school-related activities.

Suburban development is expected to continue moving southward from the city of Great Falls as the need for additional residential lots develops and will undoubtedly occur whether the project is implemented or not. However, the rate with which it occurs will change as improved accessibility to the southern areas will make it more desirable for development. Significant residential development in the southwest areas of Great Falls already exists because of the area's urban proximity, the availability of large view lots, and lower taxes. This area is expanding more rapidly than areas around Great Falls which have flood problems, noise problems (Air Force), soil problems (bentonite and gumbo), or such a deep water table that the cost of drilling is prohibitive.

Western Properties Associates have purchased for future residential development 120 acres in Ranchos Grande Vista #1, E 1/2, Section 22, T20N, R3E, between Fox Farm Road and Flood Road. Alternate Segment 6 divides this tract into two parcels neither of which, according to the developer, could be properly and economically developed as residential or commercial property so divided. This firm is also the developers of the Fox Farm Addition to Great Falls in the NW 1/4, Section 23, T20N, R3E.

Ranchos Grande Vista Subdivision is a platted and developing area west of Fox Farm Road that would be crossed by alternate segments 4, 5, or 6. This subdivision totals 320 acres and is divided into 10-acre minimum size lots. At the time this subdivision was platted, the approval of the City-County Planning Board was not required as state statutes allowed subdivision of agriculturally zoned land into 10 acre parcels without such approval. Under present statutes this minimum parcel size has been increased to 20 acres. However, procedures exist whereby the owners of lots in Ranchos Grande Vista may subdivide their properties into 5 acre parcels without the approval of the Planning Board. The Great Falls City-County Planning Board has voiced concern over this type of development. Portions of the land south and east of Ranchos Grande Vista is variously platted in plots ranging from 1/4-acre to 20 acres.

Historical/Cultural Sites

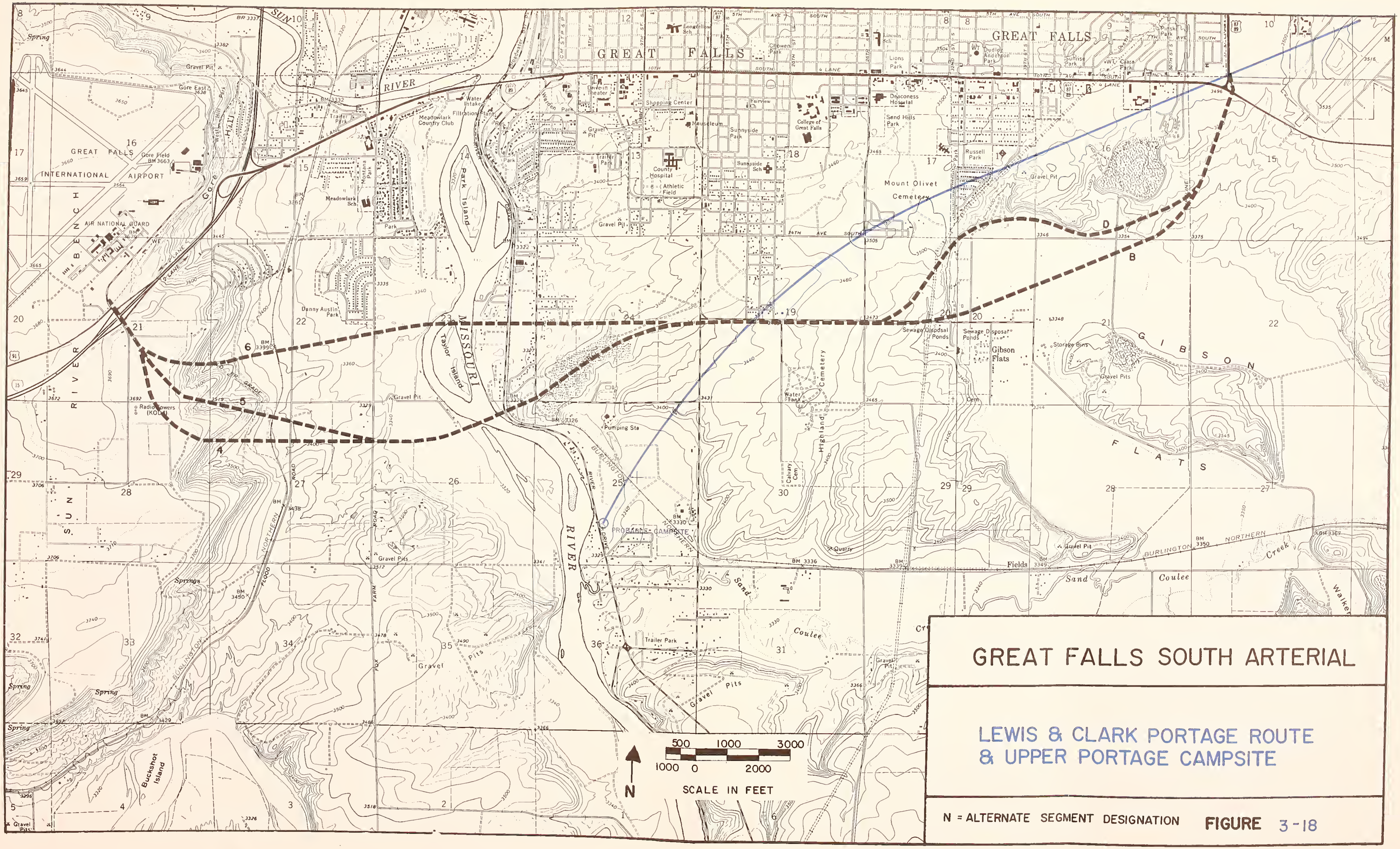
Inventory Methodology. Historical and archeological resource inventories were conducted covering the corridor encompassing the reasonable alternate route alignments and also the general route of a southerly alignment which crosses the Missouri River near Sand Coulee Creek. The inventory consisted of two phases; Phase I, which was a 100 percent pedestrian investigation of the reasonable alternate alignments and the southerly additional alignment; and Phase II, which was a comprehensive survey of the literature associated with or with reference to the general project area. Personal interviews were also conducted with local historical informants.

Historical and Archeological Sites. From these inventories six potentially significant historical sites were identified. Four of the sites consisted of remnant structures and sites of earlier habitation and/or activity and they were specifically: the charred remains of an old building, a group of old log constructed storage sheds, a non-descript depression evidencing the existence of an old structure, and the remaining roadbed of the old government railroad spur line which ran up Gore Hill to the airport. None were felt to be of sufficient historical significance to warrant inclusion on the National Register of Historic Places. The fifth site, which was later determined to actually exist outside the boundaries of the project corridor and the surveyed area, was the "Schilling site", a registered archeological site. The sixth site was the Lewis and Clark Portage at Great Falls, a National Historic Landmark.

The Lewis and Clark Trail is part of the National Trails System (Public Law 95-625; 92 Stat. 3511) and the Great Falls Portage has been on the National Register of Historic Places as a National Historic Landmark since May of 1966. The Inventory-Nomination Form for this Landmark states that "Since no permanent man-made evidence remains of the Lewis and Clark expedition's campsites and exploration of the Great Falls area, the integrity of the historic sites is dependent on the preservation of the natural scene as it was when the explorers camped there and described it." The Great Falls Portage was significant to the Lewis and Clark Expedition. Encountering the Great Falls of the Missouri affirmed that the party had selected the correct route to the Pacific. Furthermore, the time necessary to make the portage jeopardized the expedition's chances of crossing the Rocky Mountains before winter.

The locations of the portage and the upper portage (White Bear Island) campsite are not exact since there is no visible evidence of the existence of either. The upper or southwest end of the portage, which traverses the south arterial corridor, runs largely through open farmland and can only be estimated since there are two or more coulees in the area that represent possible routes of descent to the Missouri River near the White Bear camp. Also, the area has been disturbed by cultural developments. The approximate portage route and the probable White Bear Island campsite location are shown on Figure 3-18.

Impacts. All of the six alternate south arterial alignments cross the Lewis and Clark Portage Route. Since construction of the south arterial across the Landmark will affect the natural setting of the portage route and, in turn, the integrity of the Landmark, the impact will be significant.



GREAT FALLS SOUTH ARTERIAL

LEWIS & CLARK PORTAGE ROUTE & UPPER PORTAGE CAMPSITE

N = ALTERNATE SEGMENT DESIGNATION

FIGURE 3-18

Impact to a National Landmark subjects the project to the provisions of Title 36 CFR 800 and section 4(f) of the Department of Transportation Act (Public Law 89-670). Title 36 CFR 800 states that a Federal undertaking has an effect on a National Register property when it causes any change in quality of the property or setting that qualified the property for the Register. An undertaking is judged to have an adverse effect if 1) it destroys or alters property; 2) isolates it from or alters its surrounding environment; 3) introduces elements out of character with the property or alters its setting; 4) transfers or sells federally owned property without adequate provisions for preservation, maintenance, or use; and 5) neglects a property, resulting in its deterioration or destruction. Section 4(f) of the Department of Transportation Act (Public Law 89-670) states that the Secretary of Transportation shall not approve any program or project which requires the use of land from a historic site unless 1) there is "no feasible and prudent alternative to the use of such land" and 2) the program includes "all possible planning" to minimize harm to the historic site.

The proposed south arterial alignments cross the portage at two points: the SW 1/4 of Section 10 and the NW 1/4 of Section 15, T20N, R4E, and Section 19, T20N, R4E. The quarter sections in Sections 10 and 15 already had been impacted by commercial development when the portage was made a landmark in 1966 and development has increased since then. The portage route through Section 19 is less affected by development, although there are residences just north of the point where the project crosses the portage, which have been there at least since 1964.

The avoidance of the Portage Route by implementation of the no-action alternative could still result in impact to the landmark; for unless a concerted effort is made to acquire a corridor encompassing the probable portage route alignment or parts thereof, the area may soon be lost to local development which would not be subject to National Historic Preservation regulations.

Mitigation of Impacts. Both 36 CFR 800 and Section 4(f) of the Department of Transportation Act provide for mitigating measures if there are no feasible and prudent alternatives to the proposed undertaking. Title 36 CFR 800 states that if there are no feasible and prudent alternatives to avoid or satisfactorily mitigate the adverse effects of the undertaking on National Register property, and it is in the public interest to proceed with the undertaking, a Memorandum of Agreement should be drawn up among the consulting parties specifying measures to minimize the adverse effects that shall be taken before the undertaking proceeds.

In order to avoid the portage route, a south arterial alignment south of the White Bear Islands Camp would have to be implemented. As discussed in the "Alternatives" chapter, an alignment which crosses the Missouri River in this vicinity was considered but downgraded as a reasonable alternative due to poor traffic loading projections. Additionally this southerly alignment would impact the Lewis and Clark Portage more than the reasonable alternatives as it would impact the White Bear Islands Camp and would roughly parallel the Portage route, further impacting its natural setting.

Since all of the reasonable south arterial alignments will impact the Portage Route, mitigation of the impact would be required if a south arterial alternative is implemented. The impacts from the crossing would be somewhat mitigated by construction of a turnout and interpretive display near the location where the south arterial crosses the Portage Route in Section 19, T.20N., R.4E. The Montana Historical Society, Historic Preservation Office, has indicated preliminary agreement with this proposal as a possible mitigation measure.

Ongoing Actions That Might Affect the Status of the Portage. At the writing of this draft EIS, actions by two federal agencies might conceivably affect the future status of the Portage. The National Park Service is in the process of developing a comprehensive plan for the Lewis and Clark Trail. However, the plan only affects the trail where it is on federal lands. The National Park service has no acquisition authority and will seek the cooperation of local private parties and public authorities to implement the plan on other than federal lands. Because almost all of the lands traversed in the Portage route in the project area are privately owned, it appears this plan will not affect the proposed project.

The Office of Archeology and Historic Preservation is in the process of redefining the boundaries of the Great Falls Portage. This might involve reconsidering the Landmark status of that section of the Portage that runs south of Great Falls in the vicinity of the proposed arterial, since the general area south of Great Falls has been significantly impacted. However, in the meantime, the entire Portage remains a National Landmark and on the National Register of Historic Places.

Impacts on Section 4(f) Properties

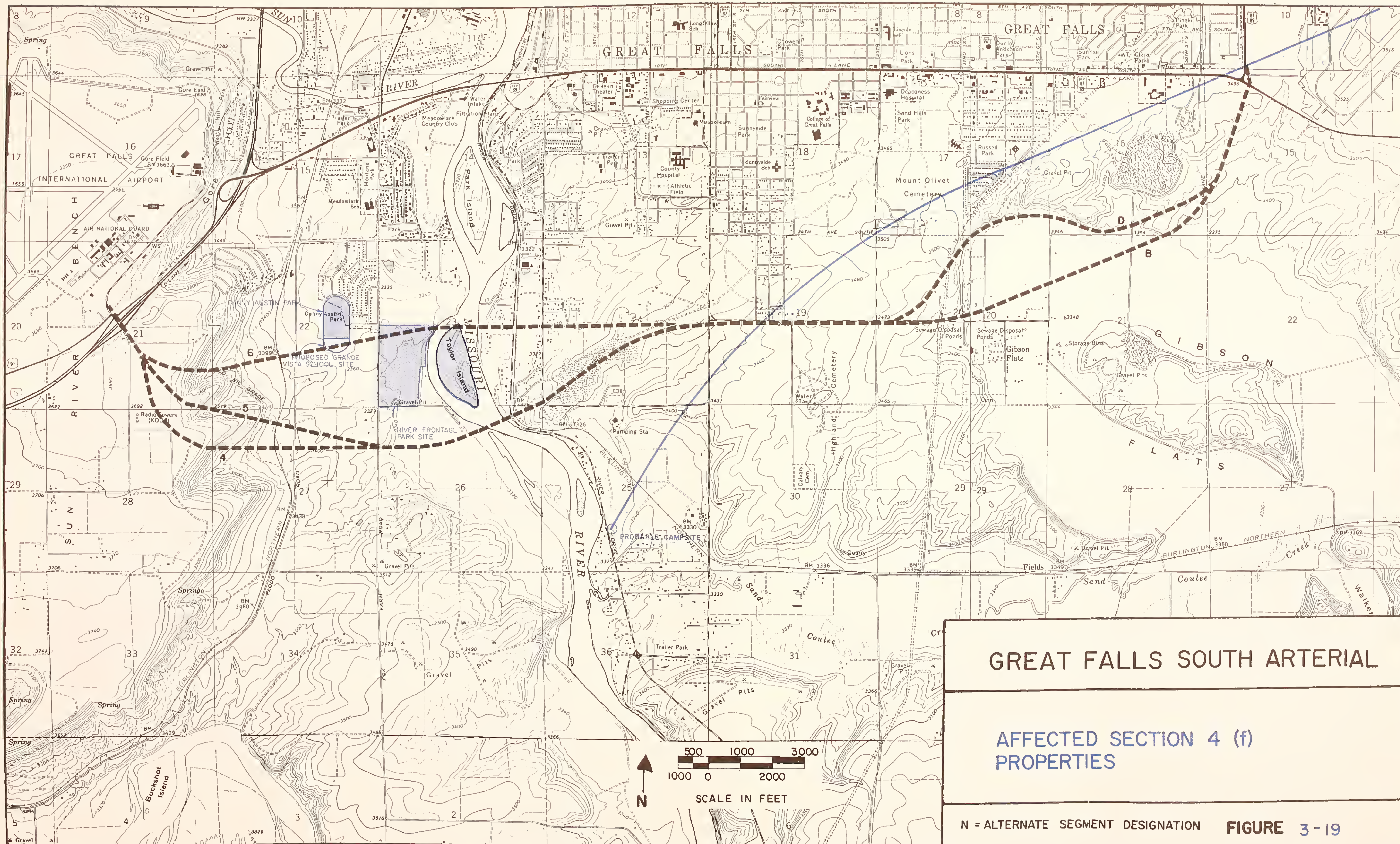
All of the south arterial alternatives will cross recreational and/or historical lands. Routes which cross such lands are subject to the provisions of section 4(f) of the Department of Transportation Act (Public Law 89-670). If there are no feasible and prudent alternatives which avoid these properties, the proposed action must include all possible planning to minimize harm.

Sites of Concern. Recreational and historical sites which will be impacted by one or more of the alternatives are shown on Figure 3-19. The Lewis and Clark Portage is discussed in detail in the section titled "Historical/Cultural Sites" and will not be discussed in depth in this section. The affected recreational sites are discussed below.

Taylor Island. Taylor Island is an undeveloped 49 acre island in the Missouri River owned by the City of Great Falls and designated as official parkland. No one lives on the island, and the only access to it is by boat. Many local residents have expressed, by letter or during preliminary public meetings, desires that Taylor Island to remain a natural area and sanctuary for wildlife. The City of Great Falls Park and Recreation Department expects that Taylor Island will either be maintained for passive recreational activities or be developed into a park. The island has been identified as a wetland area and is subject to flooding.

River Frontage Site. The State of Montana owns an 80 acre site on the west bank of the Missouri River legally described as Lot 6, Section 23, Township 20 North, Range 3 East. The site is south of and adjacent to residential development in the Fox Farm Addition and abutts on Fox Farm Road on the west. The property includes approximately 1/4 mile of river frontage, and is directly across the River from Taylor Island. It is presently leased to the City of Great Falls. The City's lease expires February 28, 1982. The Director of the Great Falls Park and Recreation Department advises that the City intends to extend the lease with the state and plans to develop the acreage for river front park land. Its proximity to Taylor Island would lend it to development in conjunction with the island. There are presently no homes, recreational facilities, or other substantial structures on the land.

Danny Austin Park. Danny Austin Park is a dedicated 16.5 acre park site in the Grande Vista Subdivision. This site has been developed by the City of Great Falls with ball diamonds and recreational equipment. An additional 12 acre parcel of private land adjacent to the present park is expected to be deeded to the City when land to the south of the existing subdivision is developed. The park will then be adjacent to the proposed Grande Vista School Site and would function as an extension of the recreational facilities provided by the school. Vehicle and pedestrian access to Danny Austin Park is good as the park is adjacent to a developed area.



GREAT FALLS SOUTH ARTERIAL

AFFECTED SECTION 4 (f) PROPERTIES

FIGURE 3-19

Grande Vista School Site. An undeveloped ten-acre tract, immediately south of Danny Austin Park, is owned by School District No. 1. The District anticipates eventual construction of either an elementary or a junior high school here. Not formally a 4(f) property, this site is discussed here because of its proximity to the park and the fact that the two facilities could act as a unit for recreational purposes.

Impacts. All of the reasonable south arterial alternatives will impact the Lewis and Clark Portage as discussed previously. The impact will be significant where the south arterial crosses the Portage in Section 19, T.20N., R.4E., as the arterial will alter the natural setting of the area.

Of the three alternate segments west of the Missouri River, only alternate segment 6 will directly impact parkland. This alternate will cross the proposed Grande Vista School site, the River frontage park site, and Taylor Island. Nearly all of the school site would be required for right-of-way. This would also result in secondary noise and visual impacts to the Danny Austin Park. Approximately 20 percent of the River frontage park site and 4 percent of Taylor Island would be lost due to construction of the south arterial and the interchange facilities at Fox Farm Road. Noise and visual impacts would affect both nearby residents and sensitive wildlife using these undeveloped park sites as a sanctuary.

With alternate segment 6, the potential for providing vehicle access to Taylor Island for park development is greatest. However, a structure to provide vehicle access to Taylor Island would take approximately 50 percent of the island. The City of Great Falls Park and Recreation Department expressed strong opposition to any disruption of future parkland for the purpose of constructing highways, bridges, and the like.

Alternate segments 4 and 5 will not directly impact any designated park or recreation land. These alternates will, however, affect part of Taylor Island and the south end of the future River frontage park visually. None of the proposed south arterial alternatives would cross existing or planned parkland on the east side of the Missouri River.

The "no action" alternative will not impact any recreational or historic sites.

Mitigation Measures. As discussed previously there does not appear to be any reasonable south arterial alternative to avoid impact to the Lewis and Clark Portage. The impacts from the crossing would be somewhat mitigated by construction of a turnout and interpretative display near the location where the south arterial crosses the portage route in Section 19, T.20N., R.4E.

Several design options for alternate segment 6 were considered to avoid the impacts to parkland. The alignment passes just south of the heavily developed areas of the Grande Vista Addition and Fox Farm Addition. Moving the alignment north would involve crossing Danny Austin Park and

the taking of numerous residences and is not considered a reasonable approach. Moving the alignment south could avoid the Grande Vista school site but would cross through the center of the future River frontage park site and Taylor Island, resulting in greater impacts to these recreational lands. This is also not considered a reasonable approach. Therefore, if alternate segment 6 were implemented mitigation of the impacts to recreational land would be required.

Mitigation of the impacts will be difficult. The river crossing structure will be quite visible and part of the recreational land will be lost to construction. However, all reasonable measures to minimize harm, such as landscaping the highway right-of-way, will be taken. The alignment of alternate segment 6 will minimize the impacts to some extent by crossing only the northern part of the River frontage park site and Taylor Island.

Alternate segments 4, 5, B, and D, and the "no Action" alternative, will avoid any direct impacts to recreational land and mitigation measures would therefore not be required.

Preliminary Coordination with Affected Agencies. As a result of preliminary coordination efforts, comments have been received from the following agencies:

- U.S. Department of the Interior, National Park Service;
- Office of Archeology and Historic Preservation;
- Montana State Historic Preservation Office;
- Montana Department of State Lands;
- Great Falls Park and Recreation Department; and
- Great Falls Public Schools.

Based on this preliminary coordination, alternatives were studied which would avoid the historical and/or recreational sites. These are discussed in the Chapter on Alternatives, in the section titled "Historical/Cultural Sites", and in this section.

As discussed in the section on Historical/Cultural Sites, the Office of Archeology and Historic Preservation is in the process of redefining the boundaries of the Great Falls Portage. This might involve reconsidering the Landmark status of that section of the Portage that runs south of Great Falls in the vicinity of the proposed arterial.

THE NATURAL ENVIRONMENT AND RELATED IMPACTS

Natural Resources

Discussion. Impacts to natural resources are considered to be those project related consequences which inhibit or eliminate the beneficial utilization and appreciation of the physical and biological wealth of the land. Impacts to soil resources, mineral resources, groundwater, vegetation, wildlife and energy resources are projected.

Existing Environment. The project corridor encompasses a varied landscape including agricultural land, residential and commercial developments, riverine environments and wetland areas. The various resources areas will be discussed individually as they occur in the project area and as they would be influenced by the project.

Soils. Much of the soil in the project area to the east is of the Azaar-Gollaher-Tally association. It is usually found in areas used as range land or non-irrigated forage land. This association is on gently undulating to rolling bedrock uplands south and west of Great Falls. The soils in this association are mainly dark-colored, well-drained, sandy soils 30 to 60 inches deep over shale or sandstone.

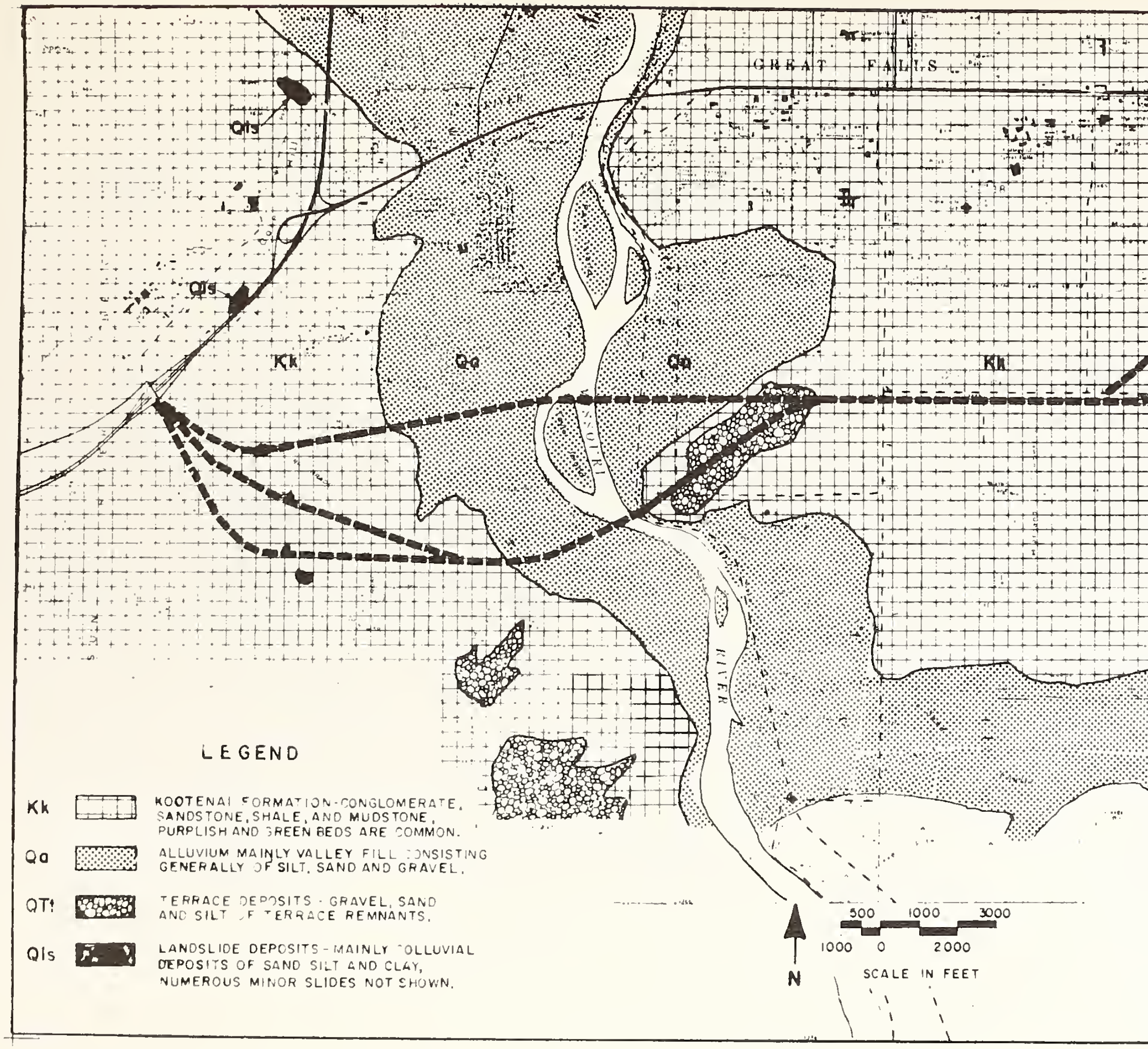
Another prominent soil subgroup is the Yetull-Gollaher-Korchea association. This soil association is on nearly level to undulating terraces and flood plains along the Missouri river between Great Falls and Ulm. The soils are dominantly deep, well-drained loamy sands; however, loam and clay loam soils occur on some nearly-level terraces. This soil association is used for nonirrigated and irrigated small grain, hay, and grazing.

The Fergus-Twin Creek association is on nearly-level flood plains in Gibson Flats. These are deep, well-drained, reddish-colored, loam and silty clay loam soils.

The eastern area of the proposed south arterial is found in soils of the Landusky-Gerber-Belt association. This soil association is used mainly for nonirrigated small grain crops. It is on gently undulating to rolling glaciated plains east and southeast of Great Falls. The soils are mainly deep, well-drained, clayey soils formed in glacial till and glacial lake sediments.

Mineral Resources. The principal mineral resources in the Great Falls area include coal, clays, building materials, and groundwater. Figure 3-20 presents a surficial geology map of the south Great Falls area. A geologic cross section of the south arterial corridor is shown on Figure 3-21.

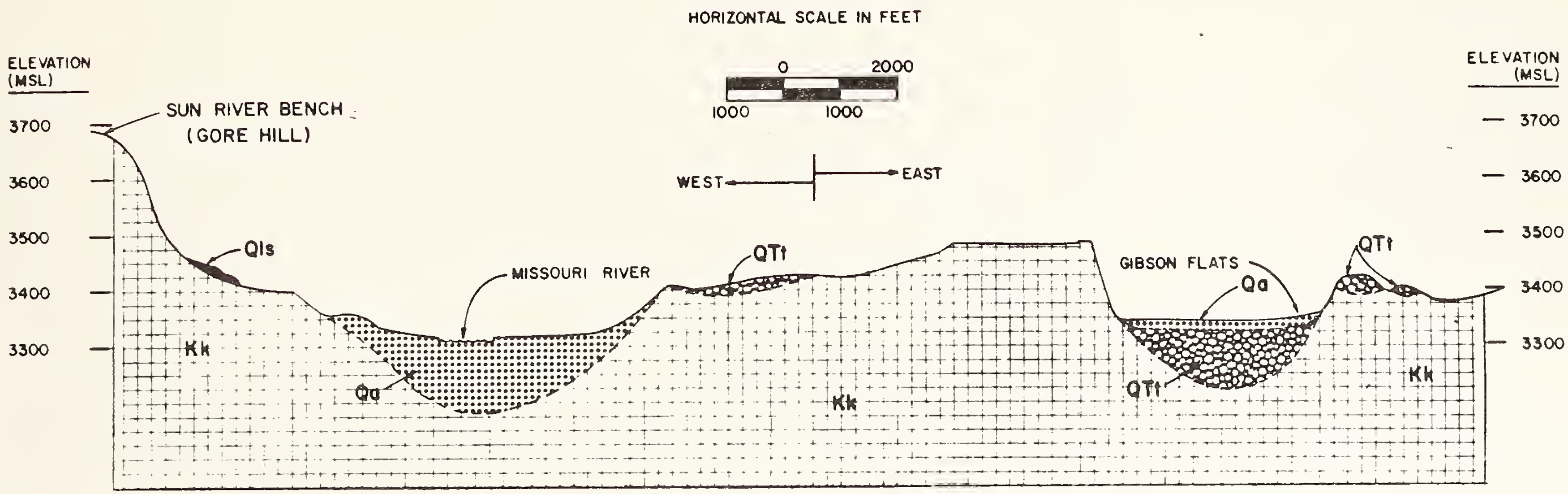
The main economic coal unit consists of about 5-10 feet of coal-bearing strata in the lower portion of the Kootenai formation. Development of this resource has occurred south and east of the project area. The nearest workings are located in Sand Coulee, approxiamtely five miles south of the proposed highway alignment. The coal as it occurs within the project area is quite deep and not economically significant at the present.



GREAT FALLS SOUTH ARTERIAL

SURFICIAL GEOLOGY MAP

FIGURE 3-20



LEGEND

Kk	KOOTENAI FORMATION - CONGLOMERATE, SANDSTONE SHALE AND MUDSTONE. PURPLISH AND GREEN BEDS ARE COMMON.
Qa	ALLUVIUM MAINLY VALLEY FILL CONSISTING GENERALLY OF SILT, SAND AND GRAVEL.
QTt	TERRACE DEPOSITS - GRAVEL, SAND AND SILT OF TERRACE REMNANTS.
Qls	LANDSLIDE DEPOSITS - MAINLY COLLUVIAL DEPOSITS OF SAND SILT AND CLAY, NUMEROUS SLIDES NOT SHOWN.

GREAT FALLS SOUTH ARTERIAL

TYPICAL TOPOGRAPHIC AND GEOLOGIC CROSS SECTION

FIGURE 3-21

The soil mantles of both the alluvium and bedrock contain clays suitable for building purposes (bricks, masonry, etc.). In addition, several of the underlying bedrock formations contain shales which are rich in fire clays. One of the more valuable clay deposits is the volcanic ash (bentonite clay) deposit of the Mowsy Formation in the Colorado shale group. The Mowsy is a silicified shale which may or may not underlie the project area west of the Missouri river on the Sun River bench. Some drillers' logs in the area refer to a bentonite shale approximately 150-200 feet deep. This highly silicified clay would not be considered a very high grade resource and development in the study area is unlikely.

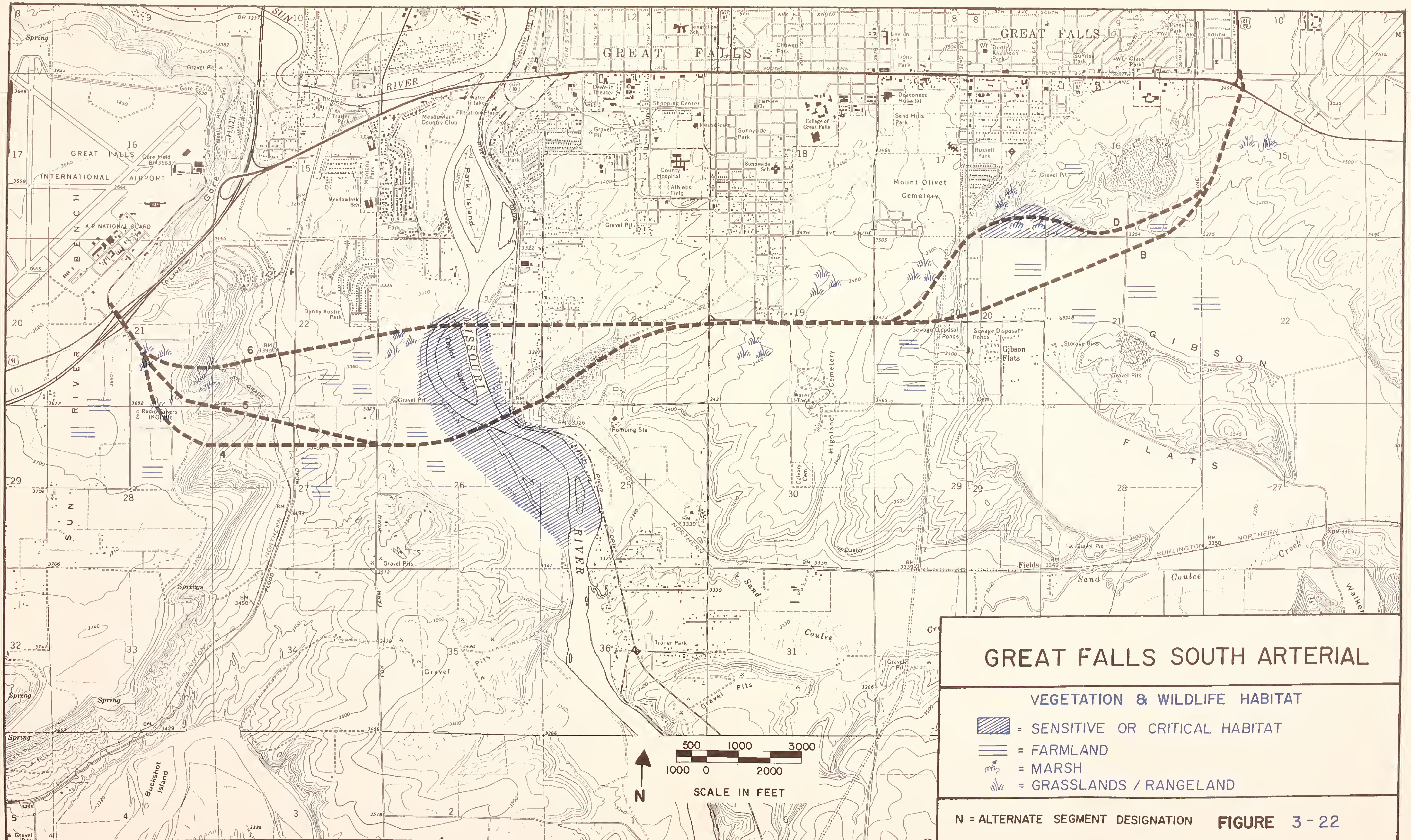
Most of the area traversed by the proposed highway alignment is dependent on groundwater for both domestic supply and irrigation. The single-most important aquifer (water-producing formation) consists of the thick (200'+) alluvial sands and gravels along the Missouri River valley, Sand Coulee Creek, and in the vicinity of Gibson Flats. Most of the wells producing from this unit are of small diameter (approximately six inches for domestic purposes) and generally yield 10-30 gpm (gallons per minute). Similar wells producing up to 100 gpm are not uncommon.

Developed water-bearing units also include various sandstone and limestone strata associated with the Kootenai and other bedrock formations. Although numerous, such strata occur throughout the study area at various depths; the two most notable include the "Third Cat Sand" which is a hard, well-cemented, basal sandstone member of the Kootenai formation and a shallower light brown limestone unit. Production in the bedrock units is generally derived from fractured zones where water is transmitted and stored in joints and cracks within the rock. The water-bearing units of the Kootenai are trapped by wells generally 300-500 feet deep. Deeper water-bearing rocks exist, such as the Madison limestone. These deeper bedrock production zones are generally in excess of 700 feet deep and have not been developed to any great degree.

Static water levels in the vicinity of the proposed highway range from about 5 to 60 feet deep for the alluvial sands and gravels. Aquifers within the bedrock are often confined resulting in artesian pressures with static levels ranging from about 40 to 300 feet, depending on the particular strata penetrated.

Vegetation and Wildlife Habitat. The dominant native biome in the Great Falls vicinity is mixed-grass and shortgrass prairie. Grasses, forbs, and yucca dominate in the uplands unmodified by cultivation. Crested wheatgrass, tall and intermediate wheatgrass, smooth broom grass, and reed grass are the common species mixed with various native legumes. The terrain is essentially open with rolling hills and plateaus interspersed with deciduous trees and shrubs along the low-lying water courses and springs. Box elder is the dominant tree species. Eastern cottonwood, green ash, Russian olive, chokecherry, peach-leaved willow, and sand bar willow are also found in the area. Wild rose is the principal understory species in and near wooded areas. Figure 3-22 identifies vegetation and wildlife habitats in the south arterial corridor.

The best terrestrial wildlife habitat in the immediate project area exists adjacent to the banks of the Missouri River and on Taylor Island situated in the river. These areas exemplify interfaces of habitat types, for example, prairie brush, woods, and riparian habitats. Inter-


GREAT FALLS SOUTH ARTERIAL
VEGETATION & WILDLIFE HABITAT
= SENSITIVE OR CRITICAL HABITAT
= FARMLAND
= MARSH
= GRASSLANDS / RANGELAND
N = ALTERNATE SEGMENT DESIGNATION
SCALE IN FEET
GREAT FALLS
MISSOURI RIVER
GIBSON FLATS
GREAT FALLS INTERNATIONAL AIRPORT
Mount Olivet Cemetery
FIGURE 3-22

faces provide a diverse physical environment which can support an abundance of wildlife.

Taylor Island is approximately 49 acres of open woods with relatively dense underbrush, primarily wild rose, and a few scattered open grassy areas. In conjunction with the 56-acre Park Island directly to the north, Taylor Island provides a unique natural area near urbanized Great Falls. Islands have many valuable qualities for inhabiting wildlife; one of the major variables is the buffer of surrounding water, which can allow species generally intolerant of human proximity to live closer to urban areas than they would on a land-bordered sanctuary. The undisturbed nature of the site can also attract migrating waterfowl, bald eagles, and other birds that require a nearby body of water. The woods provide possible perches for winter hunting bald eagles, which are an endangered species.

The slough just south of Taylor Island, once the old river channel, probably represents one of the most sensitive and productive regions of the Missouri River within the project area. The shallow waters and dense vegetation provide nursery habitat for fingerling trout and other young fishes, and protective cover for other aquatic creatures. The Missouri River between Sand Coulee Creek and Black Eagle Dam is designated as "Class 3" under the State Stream Evaluation System. There are no "species of special concern" in the area; the classification of 3 is based on a substantial fishery resource (Rainbow trout, Brown trout, whitefish and burbot especially), high aesthetic appeal and a high species diversity index. The sport fishery resource is estimated at 40 kg/300 m surface of water. The somewhat stagnant waters are optimal for emerging insect larvae, which serve as a food source for many fishes and birds.

Of secondary importance is a seasonally wet marsh proximate to the base of the bluff at the north end of Gibson Flats. The temporal nature of this habitat decreases its productivity and hence reduces its value to wildlife, although it does support nesting and foraging birds in addition to supplying cover for small mammals and rodents.

The short grass prairie biome, transected also by meandering waterways, of the region south of Great Falls provides good habitat for a variety of wildlife species. Lists of species occurring in the vicinity of Great Falls are of little value unless their functional importance relative to the community and the strength of the interactions or interconnections between them is understood. In a practical sense, it is impossible to define all of the ecological relationships for all species at a given site. Long term experimental studies in the project area would be necessary for a site-specifc analysis. Barring the existence of such long term baseline data, two approaches to wildlife impact assessment can provide indexes on the most significant probable impacts. The first is habitat evaluation and impact assessment, with extrapolation to the effects generated to the organisms themselves. The second is an emphasis on species of special concern, which are generally designated as such due to economic value or rare or endangered status.

On-site investigations of the project area indicated the most abundant wildlife habitats exist on the islands and rivershore areas of the Missouri River. Taylor Island has a known population of whitetail deer.

Beaver were seen on the riverbank west of Taylor Island and fox sightings are frequently reported in the area. Most recently, southwest Great Falls was used as a winter browse area by antelope and elk. Encroachment into these areas by housing development is already reducing the valuable wildlife habitat that still exists.

Endangered species known to occur in Montana and which may inhabit or migrate through Cascade County include the whooping crane, Rocky Mountain (grey) wolf, black-footed ferret, Peregrine falcon, and bald eagle. Only the bald eagle and Peregrine falcon have been sighted in the Great Falls vicinity in recent years. According to an agent for the U.S. Fish and Wildlife Service, the major concern is with respect to bald eagles, which are known to winter from Holter Lake (south of Great Falls) along the Missouri River as far north as Benton Lake. A 1978-79 mid-winter count sighted 12 bald eagles in the area between Holter Lake and Great Falls. They are frequently seen upstream from Warden Bridge. This indicates a significant but low-density population in the area. Since the eagles primarily hunt fish for food, they are most commonly seen perched in high trees adjacent to the river. Concern has been expressed over the potential loss of prairie dog towns because of their association as prey for the black-footed ferret, mountain plover, and burrowing owl. An agent with the Montana Department of Fish, Wildlife and Parks in Great Falls stated that there used to be a few prairie dogs southwest of Great Falls, but development in the area has eliminated them or at least reduced their habitats.

Peregrine falcons are believed to migrate through the area, although sightings are very infrequent and are not generally verified by an expert (they are difficult to distinguish at a distance from the more common prairie falcon). These birds feed mostly in open spaces on mice and small upland game birds. Agents of the Department of Fish, Wildlife and Parks do not feel the proposed arterial would significantly impact this species.

No endangered fish species or state-listed fish species of special concern inhabit the portion of the Missouri River within the project study area.

Energy Resources. Energy resources include all basic fuel supplies that are utilized for heating, electrical production, transportation, and other forms of energy requirements. These resources may take the form of fossil fuels (oil, coal, gas, etc.), or miscellaneous fuels, such as wood, solid waste, or other combustible materials.

Non-Fuel Resources. Non-fuel resources are used in either a natural or a transformed state for products and materials in the development of the human enviornment. Few activities are independent of natural resource usage. Activity that consumes materials and supplies, requires equipment and machinery, uses land, or produces waste products may have an effect on the natural resources. Various materials--aggregates, cement, steel, asphalt, etc.--are used in construction and eventually in the operation and maintenance of highways.

Natural Resource Impacts.

Soils Impacts. Soils resource impacts include the appropriation of physical land areas for facility installation and right-of-way. These areas will be basically lost as a soil resource for agriculture and development in future years. Physical impacts to the soil resource include excavation as necessary for the project construction.

Deep cuts of 60 feet or more on the east side of the Sun River bench are required for alternate segments 4, 5 or 6 and all have moderate sized embankments planned for the Missouri river east approach. Any alternative will encounter similar problems. In the Gibson Flats area, alternate segment D has numerous cuts and fills on the north and west slopes rising off of Gibson Flats. The fills will be founded on either side slopes or the clayey soils of the flats area. Alternate segment B has two moderate size cuts, which should not experience seepage problems, and one long fill across Gibson Flats. Alternate segment D would appear to be more favorable than alternate segment B from a geotechnical viewpoint. Special care is needed to establish positive drainage away from foundation soils in the Gibson Flats area.

On the Sun River Bench one of the major soil complexes, Ticell-Castner, is less than two feet to sandstone. Increased excavation costs will be associated with these soils. In the Missouri River bottom lands as well as some benches, major soils are subject to severe shrink-swell and frost heave problems. These low strength soils, such as Marias clay, Gerber silty clay loam, and Kober silty clay loam, are common throughout the study area. Soil erodibility can be a significant consideration in steep topography during construction and until vegetation has been re-established. Approximately 40 percent of the soils of the corridor are susceptible to wind or water erosion. None of these soil conditions result in prohibitive constraints to construction. Generally speaking, soils impacts can be minimized with appropriate engineering design.

Mineral Resource Impacts. The coal resources of the Great Falls area will not be affected by any of the various alternatives for the proposed highway. Although the coal strata underlies the project area (as indicated in well drillers' logs), it is several hundred feet deep. In the event coal at these depths ever become economically important the presence of the highway should not inhibit the development of these resources.

Construction of the project will result in the burying and/or excavation of the clayey soil mantles on both the alluvium and bedrock units. Some of the material may be used during construction.

No long-term impacts on the groundwater regime are anticipated as a result of any of the alternatives. Fairly thick, relatively impermeable soils overlie the bedrock and alluvial deposits and would serve to inhibit the entrance of significantly degraded drainage water which might result from the highway's presence.

Short-term impacts resulting from construction of the proposed highway are possible. Fuel, lubricant, and chemical spills could result in the introduction of contaminants into the groundwater. This situation would

apply primarily to those locations where road alignment excavations result in the stripping away of the protective soil mantle, exposing permeable alluvial sands and gravels. In the bedrock areas this would not be a problem since numerous impermeable shale strata separate water-bearing units from the surface.

Numerous water wells located along the route of the various proposed alternatives present direct access to the various groundwater formations they penetrate. Care must be taken to insure that any wells adjacent to or on the highway alignment are properly abandoned according to accepted standards prior to construction.

Vegetation and Wildlife Impacts. Agents of the U.S. Fish and Wildlife Service and the Montana Department of Fish, Wildlife and Parks have been consulted regarding vegetation and wildlife impacts. All of the alternatives would permanently remove native vegetation and disrupt a certain amount of wildlife habitat. The most critical impacts would occur at the river crossing sites--these adverse effects cannot be totally avoided because every combination of alternatives requires the spanning of the Missouri River.

Alternative segment 6 impacts the north end of Taylor Island and would, under no-vehicle access conditions, remove about 2 acres of trees and other vegetation. It would also remove trees and shrubs on the east bank of the Missouri River. Another long-term impact would be the creation of a noise and activity barrier between Park and Taylor Islands, which for some sensitive species could reduce the amount of available undisturbed habitat by more than the actual acreage removed by the bridge. Many wild birds have limits for the amount of undisturbed space they require before they will land at a given site. There are some short term impacts that will occur. Construction impacts will degrade the water quality, and hence aquatic habitats of the Missouri River by increasing sediment loading. This may be most critical in the spring and early summer due to fish spawning.

Alternate segments 4 and 5 will directly impact shoreline vegetation, especially on the west bank of the Missouri River, and will indirectly impact Taylor Island by increasing noise and human activity levels. During construction, the increased sediment loads might impact the area shorelines, particularly the west side, where some stands of cattails and bulrushes provide protective cover.

The bridge alignments for both alternate segments 4 and 5 would cross the north end of the old river channel slough. The bridge structure would be a long-term adverse impact to the terrestrial components of the environment but should not significantly impact the aquatic domain in a long-term manner. The short-term siltation impacts associated with erosion and pier placement are somewhat reduced because the arterial alignment is north, and hence downstream, from the slough area.

The eastern continuation of alternate segments, B and D, for the proposed arterial would remove a certain amount of native vegetation. Both impact the Sand Coulee Creek flood plain and drainage area, indicating that increased erosion potential generated during construction activities could impact Sand Coulee Creek and, ultimately, the Missouri River.

Alternative segment D will adversely impact the swampy marshlands at Gibson Flats. The highway embankment would cover some of the areas, eliminating them as usable wetlands.

The loss of native vegetation and wildlife habitat is unavoidable. Timing of construction and utilization of siltation traps could reduce the negative impacts on aquatic communities, particularly fish eggs and fry, associated with river crossing construction. Accepted techniques such as placement of straw bales will be employed to minimize erosion in cut and fill areas. Drainage ditch diversion to lowland regions along the arterial in the Gibson Flats area could maintain and possibly enhance roadside marshes and wetlands.

Construction of the arterial will decrease the number of animals found at the site for the following reasons:

- Deaths and injuries directly caused by clearing and construction;
- Decrease in number of food organisms;
- Decrease in the area of habitat available, as well as removal of home territories of both the aquatic and the territorial birds and mammals living on the proposed route;
- Increases in noise, air and water pollution will reduce the numbers of individuals in species sensitive to these stimuli; and
- Road kill of mammals and birds attempting to cross the road.

Most of the phases of arterial construction, and its subsequent long term existence, would not directly impact individual animals. Habitat degradation and removal will have significant secondary adverse effects on wildlife. Noise and automobile activity will reduce the quality of surrounding lands for some species. The removal of total acreage of habitat will ultimately reduce the numbers of individual organisms in a much greater area, for there are rarely any unoccupied "niches" for those displaced animals to utilize.

Adverse impacts to overwintering bald eagles in the project area would result from loss of high perch trees and/or disturbance or destruction of their hunting grounds. The only part of the proposed arterial which has the potential to impact these birds are the two proposed river-crossing structures. Suitable perch trees are found along this reach of the river. Alternate segment 6 spans the river and crosses Taylor Island where there are more trees than at the site for Alternative segments 4 and 5; however, it is unknown whether the trees which would be removed under alternative segment 6 are used by bald eagles as perch sites, so the degree of impact is unknown. Osprey and geese nesting sites are a potential concern according to the Montana Department of Fish, Wildlife, and Parks.

All three alternate segments would temporarily impact fishes and other aquatic animals in the Missouri River and could, therefore, have a secondary impact on the bald eagles by disrupting their food supply. This adverse effect would only be temporary. Long-term impacts would be the increase in noise and human activity levels adjacent to possible

feeding areas. With available undisturbed woods and an adequate food supply, however, the eagles might adjust to the nearness of vehicular traffic since they are located in relatively urbanized areas.

Care would be taken to disturb the least number of trees possible and to minimize any construction-related impacts on the aquatic community. Consultation will be initiated with the U.S. Fish and Wildlife Service to determine the significance of these impacts on the bald eagle.

Energy Resources Impacts. When a project consumes energy, this consumption should be considered as a primary or direct impact on energy resources. Transportation facilities result in the direct consumption of energy by vehicle use and in indirect consumption of energy by construction and maintenance activities. The most important variables to be considered in determining impacts on fuel resources are the rate of fuel consumption for the particular activity being considered, and the useful energy output derived from the fuel being consumed.

A common unit of heat, the Btu, may be applied to express energy consumption. A Btu is the quantity of heat required to raise the temperature of one pound of water one Fahrenheit degree. In the evaluation of transportation systems, alternatives may be compared on a Btu per vehicle-mile or barrels of oil per day equivalent.

Energy use projections were developed using the methodology outlined in the handbook "Energy Requirements for Transportation Systems," prepared by E. Shirley and J. Apostolos for a Highway Administration workshop in Denver in 1979. The direct consumption of energy by vehicles was calculated for the twenty-year period 1981-2000 using a Wang computer. The computer program used a loop which provided annual corrections for changes in traffic volumes and for per-vehicle fuel use rates. The traffic volumes used for the calculations were based on the year 2000 projections provided by the Montana Department of Highways. These projections for the year 2000 were brought back to 1981 using other data provided by the Department and incremented year-by-year by applying an annual growth factor.

The indirect energy consumption due to construction of the south arterial was calculated by reducing the construction cost estimate for four categories--landscaping, miscellany, roadway ,and structural constructions--to 1973-74 equivalent cost, then applying factors from "Energy Requirements for Transportation Systems" which convert construction dollars for each category to Btus. When averaged over an estimated useful life span, an average annual cost is determined. This method is reasonably accurate for the data obtained from preliminary cost estimates to be used as a comparison of the different alternatives. Indirect energy consumption due to maintenance is calculated from total lane-miles times a factor relating Btus per lane-mile per year.

Energy use projections were developed for four alternatives; the "no action" alternative, the "Upgrade 10th Avenue South" alternative, and two south arterial facility alternatives. South arterial alternatives 4-D and 6-B were selected for the calculations as these are the longest and shortest route alternatives respectively.

Table 3-9
ENERGY CONSUMPTION BY SOURCE

Description	Equivalent annual consumption, BTU/yr [a] No Action Alternative	Upgrade 10th Ave. South	Alternative 4-D	Alternative 6-B
Direct: vehicle fuels	4.745×10^{11}	4.495×10^{11}	4.855×10^{11}	4.665×10^{11}
Indirect: construction	0	0[b]	1.759×10^{10}	1.761×10^{10}
Indirect: maintenance	2.415×10^{9}	1.66×10^{9}	4.35×10^{9}	4.02×10^{9}
Total energy, annual average	4.7692×10^{11}	4.5116×10^{11}	5.0744×10^{11}	4.8813×10^{11}
Equivalent, barrels of oil per day[c]	225 bbl.	213 bbl.	240 bbl.	231 bbl.
Equivalent, BTUS per vehicle mile	6,815	6,447	6,350	6,265

Notes: [a]Energy due to the proposed 10th Avenue South reconstruction is not included as it is assumed it will be reconstructed regardless of construction in the South Arterial.
[b]Energy due to the proposed 10th Avenue South reconstruction is not included as it is assumed it will be reconstructed regardless of south arterial construction.
[c]Barrels of oil = BTUs/5.8×10^{6}

Sources: HKM Associates
Brown & Caldwell

The "upgrading Tenth Avenue South" alternative assumes that the recommendations of the Tenth Avenue South Improvement Plan (Robert Peccia and Associates 1979) will be implemented. These recommendations include expansion of Tenth Avenue South from four to six lanes, modification of the one-way cross streets, and improving the traffic signals and lighting.

The south arterial facility alternative assumed that the full facility with interchanges would be constructed initially. The projected traffic flows on Tenth Avenue South with the construction of the south arterial were also calculated to determine the total energy used by through and local traffic using either the south arterial or Tenth Avenue South between the airport and 57th Street. Tenth Avenue South was assumed to be a four-lane highway for the purposes of these calculations.

The projected energy consumption for these alternatives by source is presented in Table 3-9. It appears from these projections that the "upgrade Tenth Avenue South" alternative will result in the least total energy consumption. When compared on the basis of energy consumption per vehicle mile, however, the south arterial alternatives show greater energy consumption efficiency. Also, as discussed in the chapter on alternatives, the "upgrade Tenth Avenue South" alternative has been downgraded as a reasonable alternative due to its inability to meet long range transportation needs.

The demand for fuels in the United States far outstrips the production rates of domestic supplies; hence, much of the fuel resources consumed daily in the United States comes from foreign sources. This places a dependence upon these foreign sources which bears heavily upon economic stability and has obvious strategic implications. Several times during the past decade fuel supplies have been limited in many areas of the United States. Great Falls, according to several service station owners, has not experienced any supply problems but this does not mean fuel allocations to the area will not be a problem in the future.

Non-Fuel Resource Impacts. The presence of the highway will not affect the development of sand and gravel resources. However, construction of the project will call for vast quantities of sand and gravel which will have to be acquired locally. Alternative segments 4 and 5 both traverse a mined out gravel pit on the east side of the Missouri in the SE 1/4 of Section 24. Another mined-out gravel pit is located immediately north of alternate segment D in the southeast corner of Section 16.

The principal source of construction materials for the highway will probably be other nearby gravel pits such as the one located on the island terrace in the middle of Gibson Flats. This deposit alone should be more than adequate to supply the materials required for the highway's construction.

Wetlands

Existing Environment. Several land areas associated with the proposed south arterial route alternatives should be considered as wetlands under the terms and definitions of Executive Order 11990. This directive defines wetlands as follows:

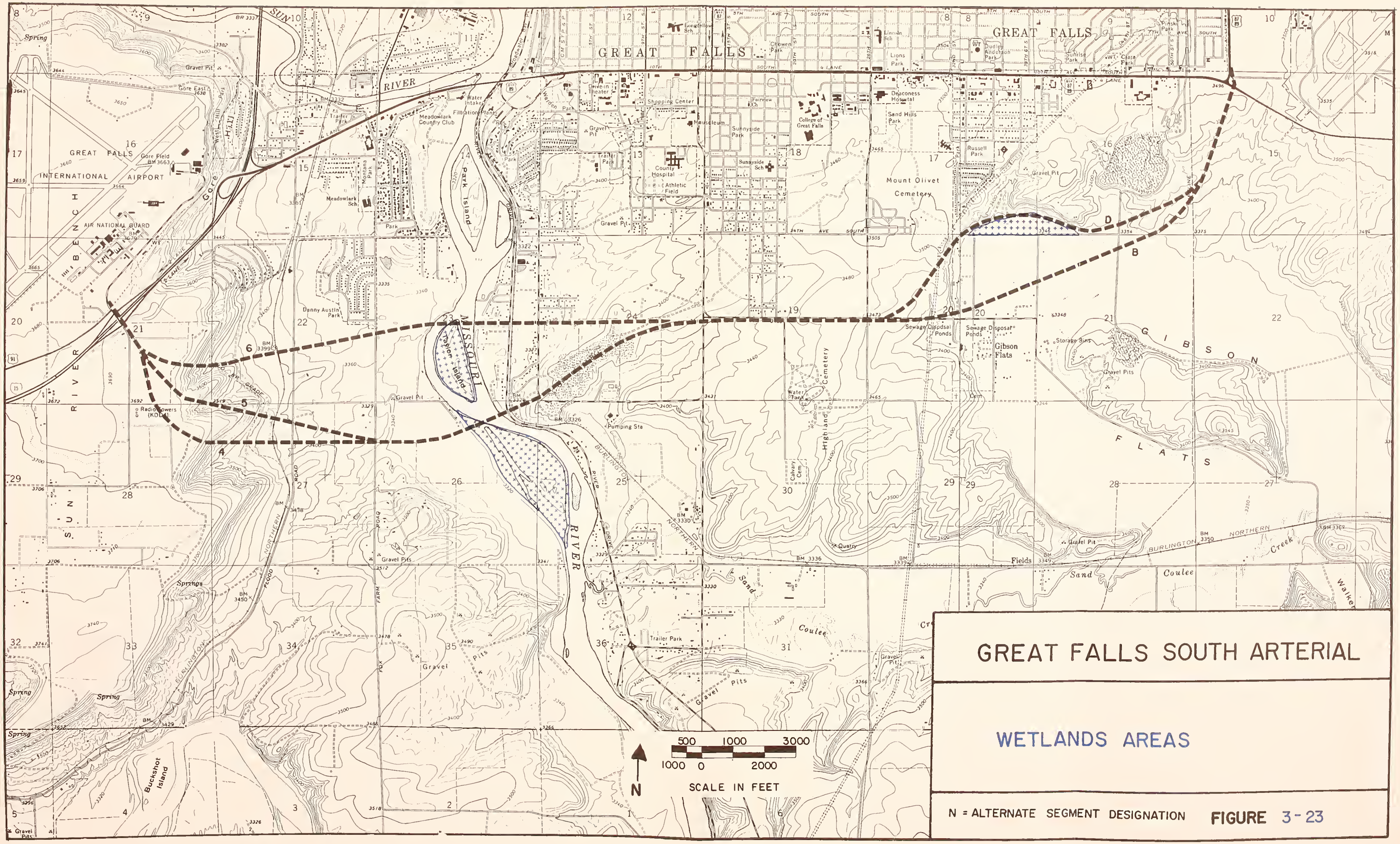
> Those areas that are inundated by surface or ground water with a frequency sufficient to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Following on-site investigations of the project corridor, three areas were targeted as wetland areas. These include Taylor Island, a 49-acre island within the Missouri River; a lowland marshy area comprising approximately 118 acres on the west bank of the Missouri River south of Taylor Island that apparently was once a part of the River channel; and a marshy area resulting from poor drainage at the base of the bluffs on the north side of Gibson Flats. These wetland areas are shown on Figure 3-23. There presently are no wetland management programs for these areas.

Impacts. The Missouri River crossing of alternate segments 4 or 5 would adversely affect approximately 4 acres of the wetlands on the west bank of the River. This old stream channel is probably the most productive wetland in the project area because it is frequently inundated by river overflows. The slough provides a water habitat for aquatic vegetation and fish and may be a significant seasonal spawning and nursery area. To minimize the wetland impact, the road alignment has been located as far north as is considered practical with the abutment and approach fill to be located on high ground outside of the wetland area. However, some piers will necessarily be placed within the wetland.

Alternate segment 6 adversely impacts approximately three acres of wetlands, two of which are located on the northern tip of designated parkland called Taylor Island. This could cause a serious impact to its potential value as a wildlife sanctuary, significantly impacting the most sensitive wildlife species. This bridge crossing will also impact approximately one acre of related wetlands on the Missouri River banks. This area will be lost. In order to minimize the impact to the Taylor Island wetland, the road alignment has been located across the extreme northern tip of the island. Again, some piers would be placed within the wetland area.

The wetland area on the north edge of Gibson Flats would be adversely impacted by alternate segment D. Impacts would result from the placement of roadway embankment fill in the wetland and from the 39th Street access, if implemented. The arterial would cover some 12 acres, eliminating about 36 percent of existing wetlands in the area. The value of these areas as wetlands is questionable, however, since development has already encroached upon much of the area. A drainage collector ditch was constructed in 1977 through part of Gibson Flats to this wetland area which has no doubt already impacted the area.



GREAT FALLS SOUTH ARTERIAL

WETLANDS AREAS

N = ALTERNATE SEGMENT DESIGNATION

FIGURE 3-23

Several long-time residents of Gibson Flats stated that the marshes dry up in the summer months, reducing their total productivity. These farmers have never seen waterfowl or other uncommon wildlife inhabiting the wetland; upland game birds such as pheasant and quail are fairly common, and blackbirds and wrens use the cattails for nesting. An on-site survey supported the residents' observations that the value of this wetland is marginal to wildlife other than those species adapted to urban proximity.

Alternate segment B will not directly impact any wetland areas. However, a secondary impact to the wetland area north of Gibson Flats will result from the extension of 39th Street South as proposed. If the design option to eliminate access at 39th Street South is implemented, no wetland impacts would result.

If the "no action" alternative is selected no direct adverse impacts would result to the wetland areas. Possible secondary impacts to the wetland in Gibson Flats could result if the "no action" alternative is selected. The area is privately owned and could be drained or filled in favor of development in the future.

Table 3-10 summarizes the areal impact of the various alternatives on the wetland areas.

Table 3-10
WETLAND IMPACTS FOR SOUTH ARTERIAL ALTERNATIVES

Alternative	Location	Total Wetland area, acres[a]	Wetlands impacted, acres[a]
4 or 5	Missouri River banks and slough	118	4
6	Missouri River Banks	b	1.1
	Taylor Island	49	2
B	none	0	0
D	Gibson Flats Marsh	33	12
No Action	none	0	0

Notes: [a]Area measured by planimeter from areal photographs and preliminary plans.
[b]Missouri River bank total area not given because this wetland region extends along the entire river.
Source: Brown & Caldwell

Mitigation Measures. Several alternative river crossings were considered for the Missouri River. The chosen crossing alternates were selected due to their perceived fulfillment of the transportation needs and their anticipated cost effectiveness. Optional crossing sites to the south did not load well under traffic loading projections and are not considered practical. Optional sites to the north would critically impact extensive tracts of developed land and are also not considered practical.

Alternate routes to the north of alternate segment D were considered as discussed in the chapter titled "ALTERNATIVES", but were not considered practical as it was felt they would be too close to 10th Avenue South, would cross too much prime commercial development property, would seriously impact existing development, and would not provide a good alignment for possible future extension to the east.

To mitigate somewhat the impacts to the wetland areas along the Missouri River resulting from construction of a south arterial, no embankment will be constructed in these areas. The bridge structure for any of the south arterial alternates will be constructed over the wetlands with only two to three piers placed in the wetlands. Construction practices to minimize the adverse effects will be utilized and any disturbed areas will be fully reclaimed with native vegetation. Alternate segments 4, 5, and 6 have also been strategically located to minimize the wetlands impact, crossing only the extreme northern part of the respective wetland area.

Flood Hazard Evaluation

Existing Environment. The two major watercourses in the project area are the Missouri River and Sand Coulee Creek. 100-year floodplain boundaries were identified for these two watercourses by the Corps of Engineers in 1974, and the U.S. Soil Conservation Service in 1973, respectively. The 100-year floodplain boundaries are shown on Figure 3-24.

The Missouri River floodplain is an active flow area. Some flood control storage is provided in upstream reservoirs. Both commercial and residential development exist in the floodplain in the project area.

The 100-year Sand Coulee Creek floodplain extends into the Gibson Flats area. Gibson Flats has a history of flooding problems as the area is a natural depression having poor drainage. Flooding can result from three possible sources: runoff from the immediate drainage areas around Gibson Flats; floodwaters from Sand Coulee Creek, entering Gibson Flats from the east; and backup floodwaters from Sand Coulee Creek entering from the south of Gibson Flats.

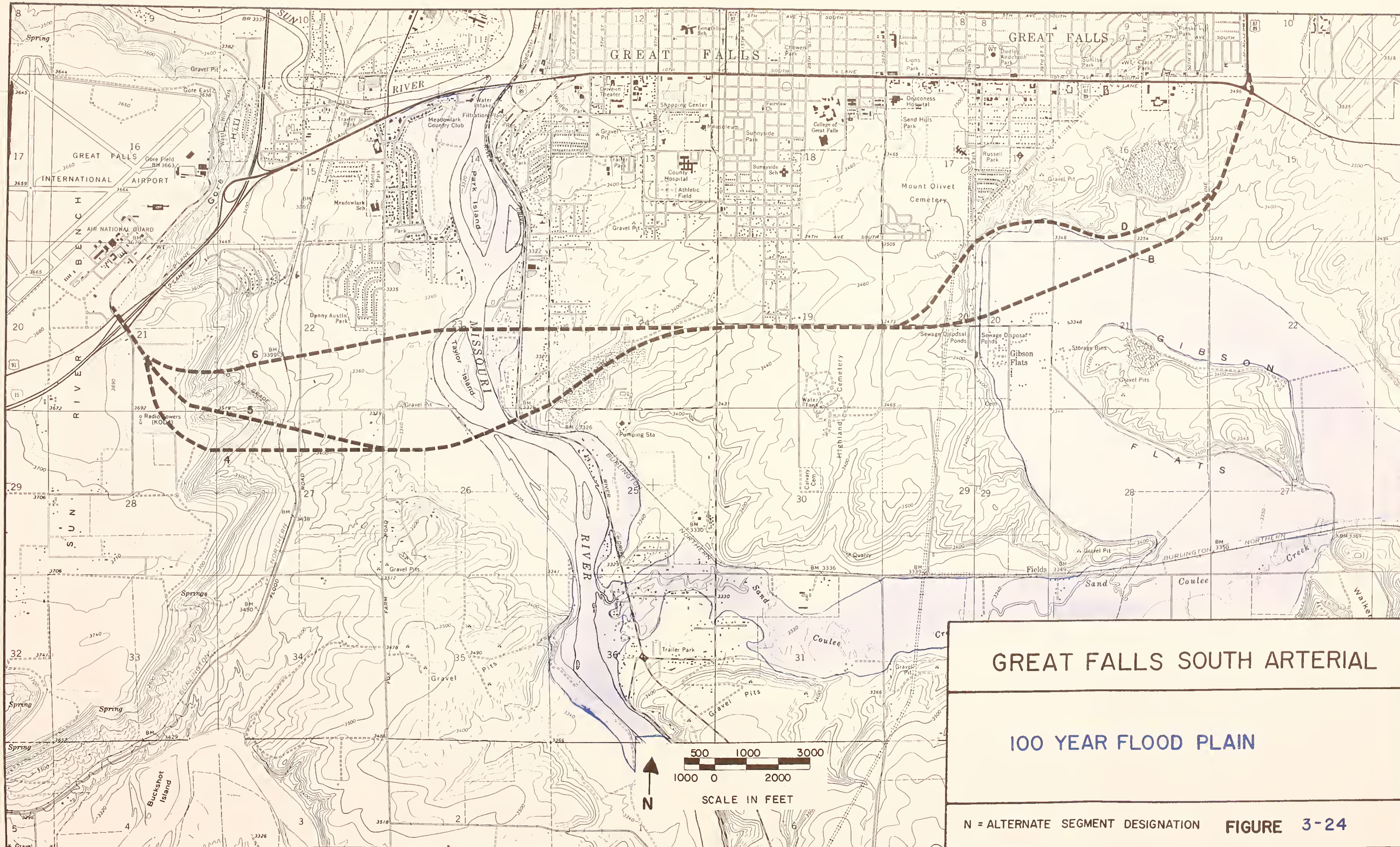
The local drainage problem results from the absence of an adequate natural drainage channel from the area. Runoff is retained until ponding occurs and water is forced over a slight rise to the south into Sand Coulee Creek. Some relief was provided by a collector ditch, constructed in 1977, which runs basically north-south through the lowlands area and empties into Sand Coulee Creek. The growing development in the area further worsens the drainage situation, since developed areas contribute more runoff than do natural or more rural drainage areas.

Impacts. The proposed crossings of the Missouri River (alternate segments 4, 5, and 6) will impact the 100-year floodway and floodplain. A computer model, using input data from the Corps of Engineers, was employed to check the effects of the proposed bridges on the flood elevations and boundaries.

The north crossing (alternate segment 6) requires placement of several piers within the floodway and approximately 1,000 feet of approach fill within the floodplain on the east side of the Missouri river. The approach fill across the floodplain has little effect on flood flows, since this overbank area conveys less than one percent of the 100-year flood under present conditions. The south crossing site (alternate segments 4 and 5) calls for placement of several piers within the floodway and floodplain, but the abutments and any approach fill are outside of the present floodplain boundaries.

The two proposed bridge crossings, as presently planned, are safely within the limitations set forth by the Montana floodplain regulations. The increases in the 100-year flood elevations caused by the structures are less than 0.1 foot in both cases, easily within the 0.5 foot maximum allowed by the state. Floodplain encroachment therefore does not appear to be a significant impact in the area of the Missouri River.

The proposed alignment for route alternate segment B would cross the Sand Coulee Creek floodplain just to the north of the present Gibson Flats community. Approximately one mile of the highway would be within


GREAT FALLS SOUTH ARTERIAL
100 YEAR FLOOD PLAIN
N = ALTERNATE SEGMENT DESIGNATION
FIGURE 3-24
SCALE IN FEET
500 1000 3000
1000 0 2000
N
GREAT FALLS
MISSOURI
RIVER
GREAT FALLS INTERNATIONAL AIRPORT
AIR NATIONAL GUARD
GIBSON FLATS
Sand Coulee
Mount Olivet Cemetery
Park Island
Taylor Island
Buckshot Island
SUN RIVER BENCH
D
B
6
5
4

the floodplain. This location of the highway would isolate a portion of the floodplain to the north, cutting it off from the main section of the floodplain. The lowest point on the finished roadway would be nearly 20 feet above the 100-year flood elevation, preventing overtopping by floodwaters. Since a potential flooding source exists on both sides of the proposed alignment (storm runoff from the north, Sand Coulee Creek from the south) drainage structures would be strategically located along the route to allow passage of floodwaters in either direction. These cross-drainage structures will allow floodwater exchange through the embankment as flooding develops and as flooding recedes. The structures will be sized and placed so as to provide adequate water movement during floods, avoiding prolonged storage in one area and eliminating differentials in water elevations on opposite sides of the highway.

Due to the nature of local drainage patterns, Gibson Flats is a flood storage area (as opposed to an active flow area), impounding water until it reaches an elevation high enough to flow out into Sand Coulee Creek. Placement of the highway embankment will reduce the storage capacity of the area by a small amount (approximately nine percent), but flood elevations are not expected to increase appreciably. The embankment does not affect the normal release point for floodwater from Gibson Flats. Floodwaters would therefore continue to flow out of the area as before, without an increase in the 100-year (or any other) flood elevation. The flooding situation in the Gibson Flats vicinity is presently a problem, but construction of the south arterial through the floodplain will not add to this problem.

The second proposed route in the Gibson Flats area (alternate segment D) generally avoids the 100-year floodplain. Drainage structures would be placed to convey upstream runoff through the highway embankment near existing drainage patterns. Storm runoff will therefore enter the Gibson Flats floodplain much as it does presently. The structures would be sized to accommodate at least 50-year flooding, with a minimal amount of additional surcharging required to handle 100-year flooding. The temporary additional surcharging is not considered to have a detrimental effect on the highway structure or local property. It is concluded that the south arterial alternatives will have minimal impacts on 100-year flooding in the Gibson Flats area.

Significant impacts on natural floodplain values include the loss of habitat and vegetation where fill and/or structures are required. The two most significantly impacted areas are the east bank of the Missouri River with alternate segment 6 and the Sand Coulee Creek floodplain with alternate segment B. The area to be potentially lost with segment 6 presently is occupied by residential units which are often considered incompatible floodplain development. The Sand Coulee Creek floodplain is an agricultural area which would suffer a permanent loss of productive cropland where the roadway crosses the floodplain. Incompatible floodplain development would be indirectly supported by alternate segment B which could induce further development within the area, particularly with the improved access at Shields Avenue (39th Street South).

Numerous surface runoff courses in the project area would be crossed by one or more south arterial alternatives. All cross-drainage structures (except the Missouri River crossing) are designed to accommodate 50-year

flooding from the total upstream contributary area with essentially no impacts. The proposed structures are generally capable of handling 100-year flood events with a small amount of additional hydraulic surcharging. It is anticipated that this surcharging will result in minimal flood impacts on the road embankment, hydraulic structures, and neighboring lands.

Alternatives to Floodplain Encroachment. There are no reasonable alternatives to encroachment on the Missouri River floodplain. Alternate segments 4 and 5 would have less impact than alternate segment 6 because the crossing site does not require roadway fill within the floodplain. Alternate segment D offers less impact than alternate segment B because it skirts the Sand Coulee Creek floodplain. However, alternate segment D crosses an area which has been identified as a wetland.

Mitigation Measures. Since any south arterial alternative must cross a designated floodplain, the proposed action is subject to the provisions of Executive Order 11988. This Order requires that consideration be given to alternatives to avoid adverse effects and incompatible development in the floodplains.

As discussed above, the impacts to the 100-year floodplain of the Missouri River and Sand Coulee Creek would be minimal with any of the south arterial alternatives. The Missouri River bridge structures are adequate to allow passage of floodwaters with minimal effect on the flood elevation. Bridge piers within the floodway will be designed to minimize floodwater impedance. Pier iceshields will be installed to combat damage from ice and minimize restriction of ice flow. Across the Sand Coulee Creek floodplain, drainage structures will be designed and located to allow uninterrupted floodwater exchange and avoid floodwater elevation differentials on opposite sides of the roadway. Incompatible floodplain development will be controlled through the County Zoning and floodplain regulations.

Stream Modification or Impoundment Impacts

The proposed action does not impound, divert, deepen or significantly modify any channel of a stream or body of water. The bridge structures crossing the Missouri River were analyzed for their potential hydraulic effects to the river flow and the 100 year floodplain. Results showed that the resulting effect would be minimal; that is, changing the 100 year floodplain less than .1 foot. Consequently no impoundment will occur as a result of the crossing structure and the project is not subject to the mandates and regulations of the Fish and Wildlife Coordination Act. The Montana Department of Highways will coordinate with the Montana Department of Fish, Wildlife and Parks regarding pier placement to assure compliance with the Montana Stream Preservation Act.

Air Quality

Existing Environment. In general, air quality in Great Falls is good. Total suspended particulate and carbon monoxide standards are violated occasionally, however - carbon monoxide more seriously than total suspended particulates. Great Falls wind conditions generally moderate pollutant buildups, thus reducing air quality standards violations.

Great Falls is recognized as one of the windiest cities in the United States. Figure 3-25, a wind rose for the Great Falls area, shows that the dominant winds are from the southwest and occasionally exceed 25 mph. The wind rose also shows the Great Falls area is calm (no wind) 14 percent of the time. Wind direction and speed are the dominant factors which influence an area's air pollution dispersion potential. Topography, temperature, precipitation, humidity, barometric pressure, atmospheric stability and the mixing depth of the wind also influence dispersion potential.

When air is extremely stable, an inversion is said to occur. Pollution released into a stable layer will be trapped and concentrated within that layer. If such an inversion is based on the surface, the pollution distribution will be greatly restricted, and high pollutant levels will occur near source areas. If an inversion layer is located above the surface, the inversion will act as a "lid," trapping and concentrating pollutants in the layer below. If the mixing layer is further confined by topographical features such as valley walls, the resulting pollution levels will be markedly higher. Thus the height of the inversion layer is an important parameter in the determination of pollution concentrations since it effectively limits the volume of the mixing layer.

Stable conditions occur in the Great Falls area occasionally during the winter season, primarily due to the effects of radiation flux. This is the phenomenon of very strong cooling of air masses such that the air becomes so stable that eddy exchange practically disappears and only radiation fluxes are left to accomplish heat exchange.

The Cascade County Air Pollution Control Program, part of the Health Department, has done considerable sampling in the the Great Falls area. In the past air measurements have been made in Great Falls for total suspended particulates (TSP), carbon monoxide (CO), sulfur dioxide (SO_2), and some particle size and chemical elements. Ozone (O_3), nitrogen dioxide (NO_2), and hydrocarbons have not been measured. It is probable that ambient hydrocarbon and SO_2 concentrations would be higher in northern Great Falls due to refinery activities. Ozone and NO_2 concentrations should be low. Table 3-11 and Figure 3-26 show present and discontinued sampling sites.

Table 3-11
PRESENT AND DISCONTINUED SAMPLING SITES, GREAT FALLS

Site	Parameters Measured	Duration
Fire Station	TSP	Long-term
Hospital	TSP, SO_4	Long-term
10th Avenue South	CO, TSP	Since 1977 (discontinued 1979)

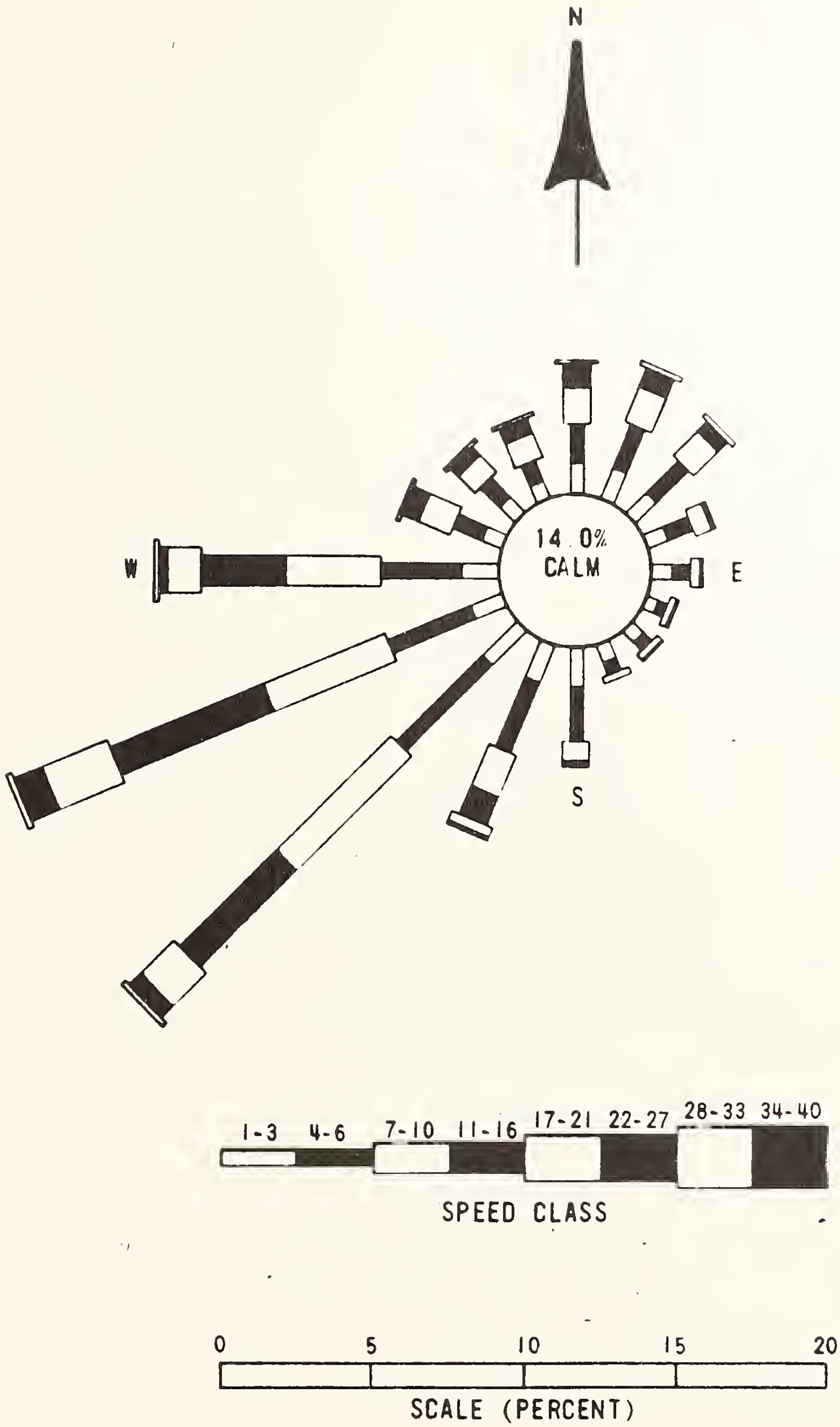


Figure 3-25. 10-year, 16-point Wind Rose
for Great Falls Area

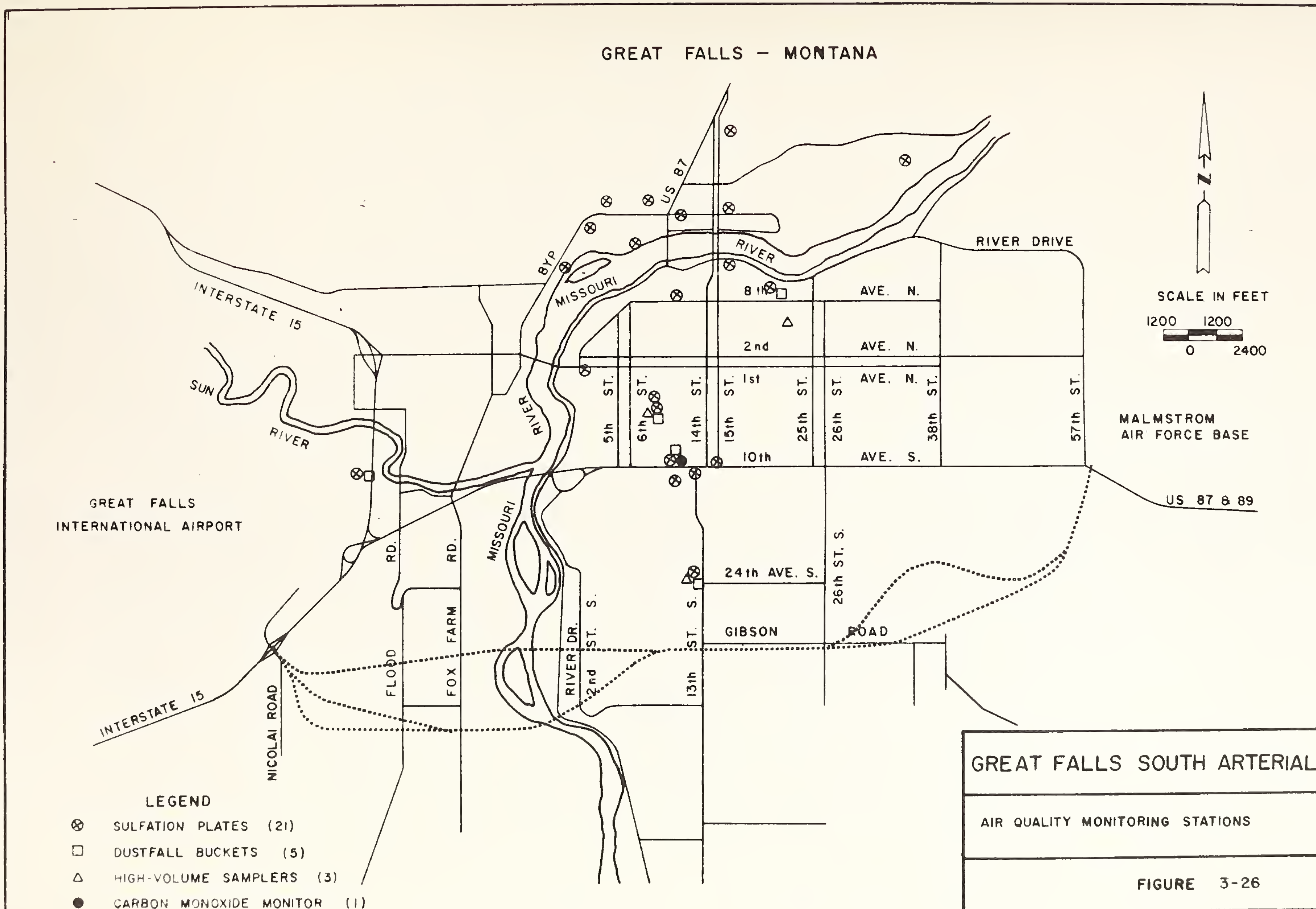

GREAT FALLS - MONTANA
N
SCALE IN FEET
1200 0 1200 2400
MALMSTROM AIR FORCE BASE
US 87 & 89
RIVER DRIVE
US 87
BYP
MISSOURI
RIVER
8th
AVE. N.
2nd
AVE. N.
1st
AVE. N.
10th
AVE. S.
5th ST.
6th ST.
14th ST.
15th ST.
25th ST.
26th ST.
38th ST.
57th ST.
26th ST. S.
24th AVE. S.
GIBSON ROAD
13th ST. S.
2nd ST. S.
RIVER DR.
FOX FARM RD.
FLOOD RD.
NICOLAI ROAD
INTERSTATE 15
SUN RIVER
GREAT FALLS INTERNATIONAL AIRPORT
LEGEND
SULFATION PLATES (21)
DUSTFALL BUCKETS (5)
HIGH-VOLUME SAMPLERS (3)
CARBON MONOXIDE MONITOR (1)
GREAT FALLS SOUTH ARTERIAL
AIR QUALITY MONITORING STATIONS

FIGURE 3-26

Table 3-11
Continued

Site	Parameters Measured	Duration
North Kiwanis Park	TSP, particle size, SO_2	New
Phillips Refinery	SO_2	Only 1974

Source: Montana Department of Health and Environmental Sciences

Considerable static sulfur oxide monitoring and some dustfall measurement have also been done. Sampling for sulfation is done using the Huey sulfaction plate. Dustfall is measured using the gravimetric method, total suspended particulates using the high-volume sampler, and carbon monoxide using an indirect infrared analyzer.

The data for the area south of Great Falls indicates sulfation readings are well below the Montana ambient air quality standards. The high-volume sampler south of 10th Avenue South is located at the Cascade County Health Department, 1130 17th Avenue South. The 1978 annual average for total suspended particulates at this station was 54.66 ug/m^3, measured in a total of 45 samples over the calendar year 1978. The dustfall readings at the same station have an average of 5.75 tons per square mile per month for the 12 months of 1978. The sulfation readings showed only a trace amount, less than .01 mg of sulfate per 100 square centimeters per day.

Standards for air pollution levels comparison have been adopted by both the Federal Government and State government. Federal standards are divided into primary standards which, when exceeded, have ill effects on human health and secondary standards which, when exceeded, can cause health and property damage.

The Great Falls downtown area has not always achieved the federal secondary standard for total suspended particulates, and is thus designated non-attainment for TSP. These higher concentrations are due partially to traffic in the congested downtown areas. There appear to be no consistent trends which might correlate with spring thawing and reintrainment of winter sanding material or with dry summer-fall dust conditions. However, it is felt that street sweeping and winter sanding contribute to high TSP levels. TSP increases in the south Great Falls area appear to correlate with southside development and with capacity traffic on 10th Avenue South. An inventory of 1977 particulate emissions in the Great Falls area indicates that fugitive dust contributes substantially to ambient particulate concentrations; see Table 3-12.

Very limited carbon monoxide data have been collected in Great Falls. Data collected at the 9th Street South/10th Avenue South monitoring station showed an arithmetic average for 1978 of approximately 2.5 parts per million of carbon monoxide over each 24-hour period. This station has reflected a number of periods where the 8-hour average is over 9 parts per million, violating the federal 8-hour standard for carbon monoxide. Most of these occurred in the winter months of January,

Table 3-12
GREAT FALLS PARTICULATE EMISSION INVENTORY, 1977

Category	Particulate Emissions, tons per year
Combustion	
Residential	4.4
Commercial/Industrial	14.0
Incinerator	1.6
Railroad/Aircraft	0.4
Auto exhaust	42.3
Fugitive dust	
Railroad yards	16.5
Clean streets	224.5
Commercial streets	88.7
Unpaved roads/Alleys	91.2
Cleared areas	4.1
Construction	84.1
Unpaved parking lots	2.6
TOTAL	574.4

Source: Microinventory Results and Use of Empirical Model at Nonattainment Sites in Montana. A PEDCo Environmental Report.

Table 3-13
POLLUTANT EMISSION PERCENTAGES BY SOURCE CATEGORY

Source Category	Percentage of areawide emissions by source category, 1970		
	CO	Hydrocarbons	NO_x
Residential	0.3	0.5	1.9
Commercial/Industrial, including solid waste disposal	7.8	25.0	11.8
Transportation	90.0	73.5	85.5
Other	1.9	1.0	0.8
TOTAL	100.0	100.0	100.0

Source: Table 7, Appendix E, Implementation Plan for the State of Montana.

February, and March. Comparisons of TSP, CO, and traffic counts have been made for 10th Avenue South. For the limited data studied, some correlation is shown between traffic and ambient CO concentrations on a daily basis, and even more so on an hourly basis.

Pollutant percentages of areawide emissions by source category are found in Table 3-13 and indicate the importance that transportation has to ambient air quality. Major traffic generators in Great Falls, where transportation-related pollutants could concentrate, include:

- Deaconess Hospital;
- Columbus Hospital;
- First National Bank;
- Northwestern Bank;
- U.S. Post Office;
- Cascade County Convalescent Hospital;
- Sears, Roebuck and Company;
- College of Great Falls;
- Holiday Village Shopping Center;
- Westgate Shopping Center;
- K-Mart; and
- Great Falls International Airport

Emission Evaluation Methodology. The EPA has designed guidelines to evaluate the impact of an indirect source, such as a highway, on air quality. (EPA -450/4-78-001, Guidelines for Air Quality Maintenance Planning and Analysis, Vol. 9, Revised, Evaluating Indirect Sources, September, 1978). It is important to estimate whether such an indirect source may cause the national ambient air quality standards for carbon monoxide (CO) to be exceeded. The one-hour standard is 35 ppm CO, while the eight-hour standard is 9 ppm CO. To evaluate this impact, the potential incremental air pollution must be added to the background concentrations at the upwind edge of the site and to the contributions from locally generated emissions (i.e., other through traffic). The degree of impact will often depend on a length of time; the hour, day, or season must be considered.

Specifically, the indirect source evaluation methodology must consider both the worst case one-hour and eight-hour periods because it is a preliminary technique and the results are based on a very limited data base. Generally local CO contributions dominate the total CO concentration for the worst one-hourly cases while the worst eight-hourly cases (the average of eight one-hourly analyses) are frequently dominated by high background contributions of CO.

The network description and traffic demand volume are used to estimate the traffic flow characteristics and emissions are then calculated. Data requirements include traffic engineering characteristics such as number of lanes, road width, turning channels, type of intersection control, signal timing, percent of trucks and buses, and design speed. In addition, through and turning traffic volumes, demographic data, diurnal traffic patterns, yearly surface and upper-air meterological data, and background and local air quality measurements are required. Emissions for an extended roadway are considered uniform and are computed on the basis of vehicle speed and volume. Emissions at intersections are the sum of those produced from non-stopping

vehicles and those emitted over a finite length by stopping vehicles. All emissions are based on the updated (December 1977) Modal Emissions Model (Kunzelman, 1974, Report No. EPA -460/3-74-005, Automobile Exhaust Emission Modal Analysis Model). Adjustments for a base year of 1977, other calendar years, and a cold-start-hot-start-speed temperature correction are found using AP-42, Mobile Source Emission Factors (1978).

Once the emission inventory has been computed, the worst-case one-hour CO concentration resulting from each source is calculated by estimating the effect of atmospheric dispersion on actual concentrations at specified receptor locations. Variables include stability, receptor location, wind speed and direction, and terrain roughness. Dispersion estimates are usually at 1.8 m above ground level. Background concentrations are then added to source contributions to find the total CO concentration.

The most common technique for evaluating the air quality impact of proposed highway projects involves the use of mathematical models of pollutant dispersion. Models are used to quantify the relationship between emissions and air quality and to provide an estimate of the impact of new sources. The reliability of model estimates is totally dependent on the availability of an accurate and complete emissions inventory and an ability to describe pollutant dispersion and transport phenomena for the emissions and the area being analyzed. The representativeness of data depends on the proximity of the meterological monitoring site to the area under consideration, its exposure, the area terrain, and the data collection time period.

Using the EPA methodology, emissions for a single vehicle (Ef, G veh^{-1} m^{-1}) as a function of vehicle speed are first determined. This value multiplied by the vehicle flow rate (veh hr^{-1}) determines the free flow emission rate Qf.

$$Qf = Ef \times V \times (gm\ m^{-1}\ hr^{-1})$$

The emission rate calculated is a reference value appropriate to vehicle emission rates for a given reference year (1977) under specified ambient characteristics.

The actual emission factors vary depending on vehicle type, calendar year, catalyst or non-catalyst, altitude, state (California or elsewhere), ambient temperature, percent of cold or hot starting vehicles, and vehicle speed. A correction factor (C_T) for these variables when multiplied by the Qf will give a more accurate emission rate (QF').

$$QF' = .AF\ (C_T)$$

To estimate the worst case condition for uninterrupted traffic flow on the south arterial, the following assumptions were made:

Emissions E_f, at cruise speed of 45 mph, equal 0.01 grams CO per vehicle-mile.
Average weighted 1990 C_T = 0.94
Peak-hour weighted 1990 C_T = 0.86

Thus uninterrupted traffic on the proposed south arterial, using the maximum projected ADT value for year 2000 of 26,400 VPD with alternate segment 6, and estimating a 4:30-5:30 PM rush hour traffic volume of 3,000 VPH, assuming

an average cruise speed of 45 mph, and utilizing a correction factor for year 1990 (C_T) of 0.86, the emission rate is:

$$Qf' = QF\ (C_T)$$
$$QF' = (30\ \text{gm CO} \times V^{-1} \times m^{-1} \times hr^{-1})\ (0.86)$$
$$Qf' = 25.8\ \text{grams CO}\ m^{-1} hr^{-1}$$
$$Qf' = 0.007\ g\ m^{-1}\ sec^{-1}$$

This emission rate would be comparable for all proposed south arterial alternatives.

Air Quality Impacts. To estimate whether CO concentrations will exceed the ambient air quality standard, a site-specific worst-case condition such as the intersection where Fox Farm Road crosses over alternate segment 6 was analyzed. At this location suburban housing would border the roadway to the north and a schoolyard is located nearby.

The south arterial is considered to be a continuous or infinite line source on which the emission rate is uniform for at least a specified or minimum length of roadway. This minimum roadway length is a function of atmospheric stability, initial dispersion wind/roadway angle, and road/receptor separation. Nonuniformity of emissions beyond the minimum length will not affect the concentrations more than approximately 2 percent at the specified receptor location. The EPA HIWAY model has been used to estimate pollutant dispersion and predict the pollutant concentration at specified receptor locations.

The results of the infinite line source dispersion analysis based on worst-case assumptions indicate that the total one-hour CO concentration at a receptor 10 meters from the center of the south arterial at Fox Farm Road is 7.0 ppm. This is the ambient concentration attributable to continuous rush-hour traffic conditions on the proposed south arterial. The total CO level is obtained by adding this value to the background concentration and should be well below the federal primary one-hour standard of 35 ppm CO.

Maximum receptor location would probably be pedestrian traffic crossing on the Fox Farm Road overpass. Other proposed intersections--Second Street South, Thirteenth Street South, 26th Street South, and 39th Street South, will have slightly higher total emissions due to slower moving on-ramp traffic. Local arterial design speeds are 35 to 40 mph. Table 3-14 summarizes projected CO concentrations at the Fox Farm Road overpass with state and federal standards.

Table 3-14
SOUTH ARTERIAL WORST CASE 1-HOUR CARBON MONOXIDE CONCENTRATION COMPARISON WITH FEDERAL AND STATE STANDARDS

Year	Site	1 hour CO Concentration	State Standard	Federal Standard
2000	Fox Farm Road Interchange	7.0 ppm	17 ppm	35 ppm

Source: Brown & Caldwell; HKM Associates

Worst-case conditions as calculated here are unlikely because the Great Falls ten-year wind rose indicates high average wind conditions (14 percent calm). In the winter months from November through late April, Arctic air occasionally covers the Great Falls area; however, due to proximity to the Rocky Mountains, the Arctic air is quite often pushed east by strong southwest winds, called "Chinook Winds." Careful study of the climatological summaries for Great Falls shows the correlation between strong southwest wind and warming temperatures. During the windy periods, the atmosphere is well mixed, hence there is little pollution problem. Pollution, therefore, has the greatest potential when stable Arctic air remains over the city for several days.

To compare the proposed south arterial for the year 2000 with the "no action" alternative, one must compare projected 10th Avenue South CO concentrations for the year 2000 with and without the south arterial. The 10th Avenue South roadway differs from the south arterial in that it exhibits interrupted traffic flow conditions and may exhibit local wind effects. The HIWAY dispersion model is inappropriate for roadway configurations in which local wind circulations dominate. Parts of 10th Avenue South may have street canyon effects, where a vortex motion forms when the roadway angle exceeds 30^{o} and the depth of penetration of the rooftop wind into the street is less than the average height of the upwind buildings.

The determination of emission rates for situations of interrupted traffic flow such as at signs and signalized intersections involves the determination of so-called "excess" emissions. These are vehicular emissions that are generated over a finite segment of roadway as a result of idling, acceleration, or deceleration; they represent the excess emissions in that region beyond these which an equal number of freely flowing vehicles would emit at cruise.

Calculating worst-case conditions along 10th Avenue South is rather complicated, considering all the variables and assumptions that must be made. Assuming that air pollution concentratons are directly proportional to air pollution emissions and that year 2000 dispersion conditions will be similar on 10th Avenue South with or without a south arterial, one can predict future air pollution concentrations by predicting future air pollutant emissions.

Currently, 10th Avenue South has fourteen traffic signals, with maximum queuing due to left-hand turns at 26th Street South. Maximum average daily traffic counts for 10th Avenue South projected for the year 2000 with a south arterial facility are on the order of 30,000 vehicles per day (VPD) between 20th Street and 25th Street. This is over 10 percent less than projected 1980 volumes at the same location (34,000 VPD). Without a south arterial, expected traffic volume at this location is 44,000 VPD. The posted speed limit along 10th Avenue South between Warden Bridge and 32nd Street South is 35 mph, increasing to 45 mph eastward to 57th Street South. Four lanes of traffic will move along 10th Avenue South through the 26th Street South intersection at an overall average travel speed of 24 mph, while two lanes of north-south traffic will cross 10th Avenue South on 26th Street South at an overall travel speed below 25 mph. Using only 10th Avenue South projections and

applying a cruise emission of .017 grams CO per vehicle-mile and no correction factor for temperature, traffic mix, or percentage of hot-cold starts, daily emissions will be 510 grams CO per vehicle-mile. Projected north-south 26th Street traffic will be greater with the south arterial by up to 700 VPD, depending on the alternative alignment. Considering an additional background concentration component arising from traffic on the south arterial, heavier 26th Street intersection traffic, but less east-west 10th Avenue South traffic, possible street-canyon dispersion effects, and adjacent commercial activity, a worst-case analysis for this intersection would indicate projected higher ambient CO concentrations affecting pedestrian receptors without a south arterial.

Another key receptor area affected by traffic volumes is Fox Farm Road. Meadowlark School ground is adjacent to Fox Farm Road. Daily volumes are projected to be nearly 23,000 VPD without a south arterial and less than 14,000 VPD with this proposed roadway. On an emission-per-vehicle basis, this amounts to an average daily Fox Farm traffic CO emission volume of 391 grams CO per vehicle-mile (no south arterial) or 238 grams CO per vehicle-mile (with a south arterial). A worst-case analysis of this potential impact, using a peak noon-hour traffic volume, light winds blowing from a southeasterly direction towards the Meadowlark School ground, and considering the noon-hour activities of children in this playground, would result in proving that the degree of exposure to CO emissions is greater at this location without a south arterial roadway, and the receptor impact is potentially much greater. It is unlikely that the projected traffic combined with the historical dispersion characteristics would result in ambient CO concentrations that would violate federal standards.

The proposed south arterial will cause both positive and negative long-term and short-term air quality impacts. Increases in automobile-generated pollutants will primarily occur within the project corridor; however, the entire southern Great Falls area will be impacted due to changes in traffic patterns. The major pollutants affecting ambient air will be carbon monoxide and particulates.

The proposed south arterial alternatives will be in conformance with the Montana state adopted plans for achieving and maintaining national ambient air quality standards (State Implementation Plans). By relieving traffic congestion along 10th Avenue South and its major arterials, control strategies for the transportation-related pollutants carbon monoxide and total suspended particulates will be enhanced, thereby helping the city of Great Falls to maintain "attainment status."

There will be an increase in air pollution emissions along the proposed south arterial route but a reduction in pollutant emissions along 10th Avenue South and the existing arterial streets, as estimated from traffic projections. Significant receptor sites affected by the alternatives are the sidewalks along 10th Avenue South, and the school playground on Fox Farm Road, where the public has access on a more or less continuous basis.

Potential air pollution impacts will be similar for each of the proposed south arterial alternatives. Pollutant buildups may occur at grades and interchanges common to all. Long uphills cause trucks to move slowly, impeding traffic and emitting more air pollution. Alternative 6B has the shortest route but the highest grades. It is nearest to Great Falls and therefore is projected to load with more vehicles. More sensitive receptors will be affected by this alternative (Meadowlark school, residential housing) than by the other alternatives.

Alternative 4B is the longest and flattest alignment. Alternative segments 4 and B are located farther south and away from the city of Great Falls than the other proposed alternatives. Automobile emissions generated from traffic on these southerly alignments would cause the least impact to ambient air quality in Great Falls.

An analysis of the consistency of transportation plans and air quality plans in Great Falls is required by the Federal Highway Administration (FHWA) and the Environmental Protection Agency (EPA). A modified roll-back procedure was used by the City-County Planning Board to predict future pollutant concentrations for the urban area on the basis of expected pollutant emissions. Using emission factors from "Mobile Source Emission Factor Tables, FHWA Technical Advisory T6640.1," (1978) and assuming an average speed of 20 mph, a temperature of 40^{o}F and 40 percent cold starts, average emissions per vehicle-mile traveled were calculated for hydrocarbons, carbon monoxide, and nitrogen oxides; see table 3-15.

Table 3-15
GREAT FALLS TRANSPORTATION POLLUTANT EMISSIONS

	Percent ADT	Emission Factor, g/veh-m Pollutant and Year 1980 HC	1980 CO	1980 NO_x	2000 HC	2000 CO	2000 NO_x	Average Emissions/VHT Pollutant and Year 1980 HC	1980 CO	1980 NO_x	2000 HC	2000 CO	2000 NO_x
Automobiles	80	6.9	79.6	2.6	2.5	2.4	1.65	5.52	63.68	2.08	2.0	19.2	1.32
Heavy-duty trucks, over 6,000 lb GVW	5	8.6	96.1	2.7	3.2	37.4	1.8	0.43	4.81	.14	.16	1.87	.09
Heavy-duty gas trucks	7	25.6	263.2	10.4	10.5	110.9	6.7	1.79	18.42	.73	.74	7.76	.47
Heavy-duty diesel trucks	5	4.5	28.3	20.2	2.9	27	5.9	.23	1.42	1.01	.15	1.35	.30
Light duty trucks 608.5 K lb GVW	3	12.5	116	4.5	3.8	43.9	2.05	.38	3.48	.14	.11	1.32	.06
							TOTAL	8.35	91.81	4.1	3.16	31.5	2.24

Source: Brown & Caldwell

Pollutant emission reductions are expected to occur by the year 2000 in all the important transportation-related pollutant categories, with carbon monoxide expected to show the greatest decrease. Calculations of projected ambient air quality in the Great Falls Transportation Study Area utilizing projected traffic volumes and roadway construction (South Arterial) indicates average ambient concentrations of CO, hydrocarbons, and nitrogen oxides will not violate 1979 existing federal standards.

Coordination with State and Local Agencies. The Air Quality Bureau of the Montana Department of Health and Environmental Sciences and the Great Falls City-County Health Department have been consulted regarding the south arterial project since the initiation of formal environmental studies. They have supplied much of the information utilized for the environmental impact assessments.

Water Quality.

Existing Environment. The potential for water quality impacts resulting from the proposed alternatives can be assessed as impacts to surface waters (the Missouri River and Sand Coulee Creek) and impacts to area groundwater from which many of the area residents draw their domestic water supplies.

The Missouri River is the municipal water supply source for the City of Great Falls with the source intake located downstream from the project corridor near 10th Avenue South. The water treatment facility is located directly east of the intake site. Water in the Missouri River in the project area is generally a hard calcium bicarbonate type with lesser concentrations of magnesium, sodium and sulfate. The river also supports various forms of aquatic and plant life which may be affected by water contamination. Water quality of Sand Coulee Creek, an ephemeral stream, is poor due to acid mine seeps from inactive coal mines south of the project area.

Available information indicates the area groundwater is a very hard mixed type with a dominance of calcium, sodium, magnesium, bicarbonate and sulfate ions. Groundwater is obtained from alluvial aquifers and sandstone and limestone aquifers of the Kootenai formation and possibly some beds of the Ellis and Morrison formation. Only the shallow bedrock aquifers are of concern as they are the main source for individual water systems and would be in hydraulic connection with areas possibly receiving highway contaminants. These shallow aquifers do occur in the project area.

Impacts. The potential for groundwater contamination exists where the water contacts either surface spills or runoff discharges. Probable contamination sources include motor vehicle fluids (fuel, lubricants, antifreeze, hydraulic fluids), hydrocarbon compounds, metals from leaded fuels, oxides from tires, herbicides from weed control operations, sodium chloride from de-icing compounds, and miscellaneous toxic compounds resulting from accidental spills due to highway accidents. These contaminants, however, would need to be present in large quantities or concentrations to affect groundwater quality. The potential impact to groundwater from these sources is expected to be minimal as large concentrations should normally not be present for any length of time.

Impacts to surface water can also result from the above mentioned sources. Storm drainage waters, primarily bridge runoff, can easily carry fugitive fluids and wear residues into the Missouri River. Additionally with heavy rains of prolonged duration, roadway runoff can carry contaminants into runoff waters and eventually into either Sand Coulee Creek, the Missouri River, and/or isolated pools of standing water.

Increased sediment loads to surface waters will most likely occur during the construction phase but could also occur for a short time following construction until slopes are revegetated or stabilized. Construction activities may affect aquatic life, particularly during spawning periods. Consultation with the operator of the Great Falls Water Treatment Plant

established that even with the heavy sediment loading occurring in the Missouri River in the spring months, the plant is able to perform the necessary filtrations. It is felt that the temporarily increased sediment loads of the Missouri River resulting from the south arterial would not present a problem.

The proposed alternative routes will have varying impacts on surface water quality. Alternate segments 4, 5 and 6 have generally equivalent potential for water quality impact as both of the proposed Missouri River crossing structures offer a source for contamination to be carried into the river with storm water discharges from the bridge surface. The roadway runoff will, with each alternate segment (4, 5 and 6), have to be carried a fair distance to be deposited into the river. Impacts on surface water quality of the Missouri River are anticipated to be minimal due to the dilution effect of the large flows of the River. Contaminants entering the river from the south river crossing will have an increased opportunity to dilute before entering the water treatment plant intake.

Alternate segments B and D offer only a remote potential for direct contamination of surface waters. Both alignments are located within the drainage area of Sand Coulee Creek, but neither has direct contact with the stream channel. Alternate segment B crosses the 100 year floodplain of Sand Coulee Creek and consequently has a greater opportunity for direct contamination in the event of a large magnitude flood. Alternate route segment B is also physically closer to the stream channel.

The "no action" alternative offers minimal potential for surface or groundwater contamination. With increased traffic loading on the Warden Bridge there will be increased runoff contaminants and increased spill potential.

Mitigation Measures. Mitigation measures to minimize the potential impacts to groundwater will include positive location of shallow aquifers so that strategies for impact avoidance may be developed.

Mitigation measures to lessen potential degradation of both groundwater and surface waters will include prompt attention to major pollutant spills, a comprehensively planned and implemented erosion control and revegetation plan, and prudent application of deicing salts. The contamination of groundwater and surface waters by vehicle borne contaminants should be minimal due to the relatively minor quantity available to enter ground and/or surface waters and the dilution effect of the large river flows.

Water quality for the Missouri River is monitored at the Great Falls Water Treatment Plant. These measurements can be used for comparisons with water quality during and after construction of a south arterial alternative. Also, construction will be coordinated with the U.S. Fish and Wildlife Service and the Montana Department of Fish, Wildlife, and Parks to minimize impacts to aquatic life during construction.

Construction Impacts

Air Quality. Any of the route alternates, when under construction, will impact the air quality of the project area. During the construction phase, major air pollutants and their probable sources can be described as:

- Gaseous and particulate emissions from machinery and machinery operations;
- Fugitive particulate emissions from blasting, excavation, wind erosion on exposed cuts and fills and on-site materials treatment operations; and
- Indirect source emissions, both gaseous and particulates, resulting from support vehicles traveling to and from the construction site.

Gaseous pollutants are generally carbon monoxide, hydrocarbons, nitrogen oxides, and photo oxidants. All have direct or indirect impacts on human health and vegetation. Particulate emissions contribute specifically to respiratory disorders and interfere with light absorption when deposited on vegetation.

Generally the effects of air pollutants during construction are unavoidable but transitory until the construction is complete. Mitigation measures applicable include:

- the use of mobile spray equipment at the construction site;
- proper timing and rapid revegetation of exposed cut and fill slopes and waste and borrow areas; and
- vehicle speed restrictions on unconsolidated road surfaces.

An erosion control plan will be prepared for areas that will be without vegetative cover for an extended time period.

Noise. Increased ambient noise levels will be experienced during the construction period and will vary with the time of the construction and the proximity of the activity to the noise recipient. Construction noise also varies with the type of equipment being operated. Table 3-16 presents average noise levels for various types of construction equipment at a distance of fifty feet.

Table 3-16
APPROXIMATE NOISE LEVELS FOR
CONSTRUCTION EQUIPMENT

Type Of Equipment	Typical Sound Level dBA At 50 Ft.
Dump truck	88
Portable air compressors	81
Concrete mixer (truck)	85
Jackhammer	88
Scraper	88
Dozer	87
Paver	89
Generator	70

Table 3-16
Continued

Type of Equipment	Typical Sound level dBA at 50 Ft.
Piledriver	101
Rock drill	98
Pump	76
Pneumatic tools	85
Backhoe	85

Source: Federal Register 39 (121) (June 21, 1974): 22298.

The various alternatives would have similar impacts on ambient noise levels, although alternate segment 6, by virtue of being situated nearer to existing development, will have a greater impact potential than alternate segments 4 or 5. Similarly, alternate segment D will have a greater impact potential than alternate segment B.

The proposed project is scheduled to be constructed in phases over an extended period of time. Noise attenuation techniques, including scheduling of construction activities during daylight hours and requiring equipment noise dampers, can partially eliminate most of the irritating construction noise.

Water Quality. Significant water quality impacts could occur during the construction phase resulting from roadway cuts and fills. Changes to the groundwater levels could result if an aquifer is severed during cut and fill operations. Vulnerable areas include the Sun River Bench descent (Gore Hill) and the north edge of the Gibson Flats area where cuts and fills are anticipated. Identification of groundwater tables and aquifers will allow initiation of appropriate measures which will help minimize impacts. Truncated groundwater flows commonly cause slope instability, but the installation of drains can provide a measure of protection. Interception of aquifers during construction activities can also result in groundwater contamination. Identification of suceptible aquifers will help avoid this situation.

There will also be surface water quality impacts resulting from erosion on exposed slopes. During construction of the Missouri River crossing structure and following excavation operations, bared soil will be subject to wind and water erosion. Contamination will occur at either Sand Coulee Creek or the Missouri River with the latter being the ultimate receptor. To minimize these potential impacts an erosion control plan will be prepared and instigated early during the construction phase. Caution will be observed when working near the Missouri to avoid intensifying erosion potentials. Pier construction for the bridge structure will be scheduled during periods of low water turbidity. To avoid potential petroleum waste contamination, areas will be designated for storage of all hazardous wastes and waste accumulations will be properly disposed of.

Borrow and Waste Areas. The south arterial facility can generally be designed so that cut and fill quantities balance. Alternate segment B, though, would require approximately 100,000 yards of borrow material to cross Gibson Flats and provide access to 39th Street South at a level above the 100 year floodplain. Adequate borrow material

would be available directly northeast of Gibson Flats. Borrow material removal will be subject to the rules and regulations of the Montana Open Cut Mining Act, necessitating a mine reclamation plan to be filed with the State. Impacts resulting to the borrow area or as a result of the borrow area would be minimal. Temporary site specific air pollution will probably occur during borrow operations.

Detours. Periodic use of detours will be necessary when construction occurs near existing roadways. Temporary impacts resulting from detours include air quality degradation, increased noise levels along the detour route and minor inconveniences to motorists and residents. These impacts will be minimized by proper construction phasing, selection of detour routes that avoid developed areas, separation of haul roads and detour roads, and measures appropriate to lessening air quality and noise impacts.

Wetlands. Construction activities will impact wetland areas as a result of increased water turbidity. Necessarily some wetlands area will be lost as a result of project implementation but this impact is unavoidable. Water turbidity will be temporary and not cause permanent damage. Temporary impacts will also result as piers are situated (alternate segments 4, 5 and 6) and as noise and activity interrupt the wetlands biotic ecology.

IMPACT/ALTERNATIVE COMPARISON SUMMARY

Table 3-17 identifies and discusses briefly the probable beneficial and adverse impacts identified for the various alternatives. The table does not present any new information; it is offered as a compact concise summary of the impacts previously discussed. It has the advantage of presenting the alternatives and projected impacts in tabloid form so to permit convenient visual comparison of the alternatives and impacts. Where an impact is projected to be equivalent for several alternatives, the impact is described in one block spanning all of the affected alternatives.

Table 3-17

IMPACT/ALTERNATIVE COMPARISON SUMMARY

Impact Criteria \ Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Transportation	All of the six south arterial route alternatives will meet the identified transportation needs to reduce congestion on 10th Avenue South, provide an arterial route to improve access for future development in south Great Falls, and provide an alternative route for through traffic.						None of the transportation needs are met.
Traffic Volumes	With construction of the South Arterial, Year 2000 traffic on 10th Avenue South is projected to remain at about current levels. The range of projected Year 2000 average daily traffic (ADT) volumes for the South Arterial and for 10th Avenue South is presented for each of the alternatives. Detailed traffic projections are shown on Figures 2-5 through 2-10.						The No Action alternative infers continued high traffic volumes on 10th Avenue South which in the year 2000 would be in the range of 19,220 to 44,690 vehicles per day. See Figures 2-11 for detailed projections.
	South Arterial: 11,560-22,110	9,150-22,110	11,560-22,110	9,150-22,110	11,560-26,420	9,150-26,420	
	10th Avenue South: 10,570-30,160	11,290-30,160	10,570-30,160	11,290-30,160	10,570-29,190	11,290-29,190	
Design Options	Four design options have been considered for the South Arterial. These include: 1) staged construction; 2) at-grade intersections versus interchanges; 3) two interchange configurations at the eastern project terminus; and 4) optional access locations.						Not Applicable

Table 3-17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Impact Criteria \ Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Design Options (Continued)	Staged construction will minimize the financial impact of project implementation while providing a facility to meet growing transportation needs. Key elements of this option include early acquisition of right-of-way for the south arterial, upgrading 10th Avenue South to temporarily reduce congestion until the south arterial is built, and initial construction of two lanes for the south arterial with at-grade intersections. While at-grade intersections can be designed at most locations to handle Year 2000 traffic, interchanges would provide operational benefits and would insure that the South Arterial will be able to meet transportation needs beyond the Year 2000. A diamond interchange and a partial cloverleaf interchange have been considered at 10th Avenue South and 57th Street. A diamond interchange would have lower right-of-way costs but construction cost would be greater than for a partial cloverleaf configuration. A partial cloverleaf would operate more efficiently but would require relocation of two commercial businesses. Design options for access locations include the addition of access at Flood Road and/or the deletion of access at 39th Street South extended. Access at Flood Road would reduce traffic on Fox Farm Road somewhat but would not significantly affect traffic volumes on I-315 or on 10th Avenue South. Access at 39th Street South would reduce traffic volumes on 10th Avenue South but would impact a wetland area north of Gibson Flats.						

Table 3-17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Impact Criteria \ Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Length	8.92 miles	9.06	8.71	8.85	8.37	8.51	Not Applicable
Right-of- Way, Engineering, and Construction Costs	R.O.W. $ 3,970,600 Engr. 2,611,100 Constr. 23,737,500 Total $30,319,200	4,144,300 2,621,500 23,831,800 $30,597,600	3,905,100 2,559,500 23,268,000 $29,732,600	4,078,800 2,569,900 23,362,300 $30,011,000	4,689,000 2,699,400 24,540,100 $31,928,500	4,862,700 2,709,800 24,634,400 $32,206,900	No Impact
Social and Economic Impacts	Positive Impacts: Improved transportation and safety, reduced 10th Avenue South traffic congestion, improved accessibility and convenience, increased development potential, improved economic base, improved fire and police protection and creation of a scenic highway. Adverse Impacts: Decreased property values in several residential areas and possibly personal aesthetic impacts. There will undoubtedly be an inducement for some population growth and commercial development. There will be short-term employment gains directly and indirectly related to the project. The viability of the CBD and 10th Avenue South business district should be enhanced. There will be physical neighborhood divisions and necessary utility line relocations. The project will obligate extensive financial resources but concurrently should foster increased property tax revenues.						Secondary impacts to residents and businesses along 10th Avenue South due to traffic congestion.

Table 3- 17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Impact Criteria / Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Relocation Impacts	5 residences 2 commercial 2 other	5 2 1	4 2 2	4 2 1	63 6 13	63 6 12	0 0 0
Visual Impacts	134 seriously impacted residences	103	135	104	176	145	0
	These visual impacts will be both short-term and long-term resulting from the physical presence of the facility and construction related visual impacts.						
Noise Impacts	None of the south arterial alternatives will predictably produce noise levels above the 67dBA FHWA design criteria outside the right-of-way. In some areas though, noise level increases exceed EPA designated criteria of a 10dBA increase over existing ambient noise levels. Alternate segments 4D and 5D would produce lower noise levels at major south arterial intersections than the other route alter-nates. Alternate 6B would produce the most significant noise level increases.						Increased 10th Avenue South noise levels.
Land Use and Zoning Impacts	455 total acres required; 275 acres agri-cultural land	493 334	434 303	472 362	337 202	375 261	No impact

Table 3- 17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Impact Criteria \ Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Historical and Cultural Sites Impacts	All of the South Arterial alternatives will cross the Lewis and Clark Portage, a National Historic Landmark. The impact will be significant where the South Arterial crosses the portage route in Section 19, T20N, R4E since the natural setting will be altered. However, the natural setting has already been disturbed by cultural developments to some extent and no physical evidence of the portage remains.						No direct impact would result from this alternative. However, future development will alter the natural setting and impact the Lewis and Clark Portage landmark.
Section 4f Properties Impact	The previously discussed Lewis and Clark Portage will be impacted by all of the South Alterial alternatives.						No impact
	These alternatives in total will not directly impact any designated park or recreation land. They would visually impact Taylor Island and the future River frontage park site.				These two alternatives would directly impact Taylor Island, the River frontage park site and the Grande Vista School site. They would indirectly impact Danny Austin Park visually and by increased noise.		

Table 3- 17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Impact Criteria \ Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
4f Properties Impact (Continued)					These alternatives would require two acres from Taylor Island, 16 acres from the River frontage park, and nearly all of the school site which is not specifically a 4f property		
Soils Impacts	Various amounts of soil resource will be lost by the implementation of a south arterial. Soil will be transferred during cut and fill operations. Any soils limitations can be overcome with proper engineering.						No impacts
Mineral Resources Impacts	The Great Falls area coal resources would not be affected by the project. Minor clay resources would be lost but the loss would be minimal. Long term ground-water impacts are not anticipated but the potential for impacts increases slightly. Adequate gravel and sand deposites are available for construction.						No impact
Vegetation and Wildlife Habitat Impacts	Alternatives 4B, 4D, 5B, and 5D would require the removal of shoreline vegetation and wildlife habitat where the Missouri River is to be crossed.				These two alternatives require the removal of both shoreline vegetation and the disturbance of approximately two acres of Taylor Island's		Future development in the South Great Falls area will continue to encroach upon

Table 3-17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Impact Criteria \ Alternative	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Vegetation and Wildlife Habitat Impacts (Continued)					vegetation and wildlife habitat.		wildlife habitats, reducing the valuable habitat that still exists.
	The eastern continuation of all of the alternatives will require the removal of certain amounts of native vegetation in Gibson Flats. No rare or endangered species are known to frequently inhabit the project corridor. Aside from from direct impacts to vegetation, wildlife and wildlife habitat adjacent areas will be indirectly impacted as a result of noise and activity which could result in the loss of wildlife to the area.						
Energy Resources Impacts (Expressed in BTUs per vehicle mile)	Between 4D and 6B	<u>Longest Route</u> 6,350	Between 4D and 6B		<u>Shortest Route</u> 6,265	Between 4D and 6B	6,815
Wetlands Impacts	These four alternatives would affect approximately 4 acres of wetlands along the west bank of the Missouri River.				These two alternatives would impact approxi- 3 acres of wetlands; 2 acres on Taylor Island and 1 acre of river bank wetlands along the Missouri River.		No direct impact. Secondary impacts could result if privately owned wetlands are drained or filled in favor of development.

Table 3- 17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

<table>
<tr><th>Alternative / Impact Criteria</th><th>Alternative 4B</th><th>Alternative 4D</th><th>Alternative 5B</th><th>Alternative 5D</th><th>Alternative 6B</th><th>Alternative 6D</th><th>No Action Alternative</th></tr>
<tr><td>Wetlands Impacts (Continued)</td><td>A secondary impact will result to the north Gibson Flats wetlands if the 39th Street access is implemented.</td><td>This alternative would impact 12 acres of wetlands in north Gibson Flats. Elimination of the 39th Street access would lessen the impact.</td><td>Same as 4B</td><td>Same as 4D</td><td>Same as 4B</td><td>Same as 4D</td><td></td></tr>
<tr><td>Flood Hazard Evaluation</td><td colspan="6">All of the alternative routes would impact the Missouri River 100-year floodplain by virtue of the River crossing structure. Computer models determined that none of these impacts would be significant. Alternate routes 4B, 5B and 6B would bisect the Sand Coulee Creek floodplain resulting in minimal impact.</td><td>No impact</td></tr>
<tr><td>Air Quality Impacts</td><td colspan="6">Site-specific worst case analyses indicate that neither Federal nor State Air Quality Standards would be violated as a result of increased traffic volumes or redirected traffic patterns. In all probability air quality will improve on 10th Avenue South due to the decreased traffic load.</td><td>Continued Air Quality Impacts on Tenth Avenue South</td></tr>
</table>

Table 3- 17

IMPACT/ALTERNATIVE COMPARISON SUMMARY
(Continued)

Alternative / Impact Criteria	Alternative 4B	Alternative 4D	Alternative 5B	Alternative 5D	Alternative 6B	Alternative 6D	No Action Alternative
Water Quality Impacts	With all the alternative routes the potential for water quality impacts exists. Groundwater quality impacts can result if major road excavation cuts intercept groundwater acquifers or as a result of roadway surface contaminants seeping into the groundwater regime. Surface waters may become contaminated as a result of construction generated sediments, surface spills getting into the runoff channels, and roadway contaminates being discharged during stormwater runoff into the waterways. The potential for contamination is greater near the Missouri River than near Sand Coulee Creek but the dilution effect of the Missouri would counteract most contaminations.						Increased traffic loading on the Warden Bridge will result in increased runoff contaminants and increased spill potential.
Construction Impacts	Construction activities will result in short term impacts to air quality, noise, water quality, and wetlands. Alternatives 4B, 5B, and 6B will require the use of approximately 100,000 cubic yards of borrow for the Gibson Flats crossing. Periodic use of detours will be necessary when construction occurs near existing roadways.						No impact

CHAPTER 4 - DRAFT EIS CIRCULATION LIST

CHAPTER 4 DRAFT EIS CIRCULATION LIST

This Statement is distributed to the following federal, state, and local agencies and officials, and other private organizations and individuals:

FEDERAL AGENCIES

Federal Housing Administration
Housing and Urban Development
Office of the Director
Federal Office Building
301 South Park Avenue, Drawer 10095
Helena, Montana 59601

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Omaha District Corps of Engineers
7410 U.S. Post Office and Courthouse
Omaha, Nebraska 68102

U.S. Department of the Interior
Office of Environmental Project Review
Attention: Bruce Blanchard, Director
Washington, D.C. 20242
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Department of Natural Resources
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1625 11th Avenue
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Environmental Quality Council
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P.O. Box 215
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CHAPTER 5 - COMMENTS AND COORDINATION

CHAPTER 5 - COMMENTS AND COORDINATION

INTRODUCTION

Early in the project planning, efforts were initiated to coordinate with appropriate local, State, and Federal agencies for assistance in the identification of reasonable alternatives; evaluation of social, economic and environmental impacts; and evaluation of measures to mitigate significant adverse impacts resulting from the proposed project. In order to accomplish this interagency coordination and insure continual public awareness and involvement in the project planning process, a project steering committee was formed to review project planning and environmental assessment efforts. Additionally, monthly meetings were held with the Great Falls Transportation System Planning Technical Advisory Committee (TAC) to present progress reports and coordinate this project with area transportation planning efforts. The general public was given formal opportunities to comment at two public information meetings held in Great Falls.

COORDINATION

The project steering committee, composed of officials from the City of Great Falls, Cascade County, the Federal Highway Administration (FHWA) and Montana Department of Highways, (MDOH) reviewed progress on the interactive planning process monthly. Eight review sessions have been held to date to evaluate project progress. This committee was the primary coordinating body for the south arterial planning study and the project's environmental assessments. Although the meetings were not publicized, the information was always available to the public.

Project updates have been given at eight Great Falls TAC meetings to date, at which input was solicited from the committee directly and indirectly from the public as the monthly TAC were regularly scheduled public meetings. These two committees provided valuable input regarding access availability, route alignment alternatives, and impact considerations. All comments were considered and incorporated as appropriate.

One meeting was held June 6, 1979 with the MDOH Impact Evaluation Group, which is composed of members from the State of Montana Department of Natural Resources and Conservation; Department of Community Affairs; Department of Highways; and Department of Fish, Wildlife and Parks. In addition, an FHWA representative is in the group. Direct mailings dated March 22, 1979 and August 9, 1979, solicited input from affected federal, state and local agencies. The U.S. Army Corps of Engineers agreed to serve as a cooperating agency as requested on October 30, 1979.

PUBLIC INVOLVEMENT

Public involvement in the planning and impact assessment was formally solicited on two occasions. Public information meetings were held April 5, 1979 and August 21, 1979 at Sunnyside Elementary School in Great Falls with nearly 200 people attending the two public meetings. Good

participation was received from citizens with primary concerns being the potential relocation of residents and homes and the personal impacts of the various route alignments on residents. Those living in the immediate vicinity of the proposed alignments expressed the contention that they chose to live in this particular area because of its undeveloped, scenic nature and a major arterial highway would degrade their neighborhood.

Written comments were solicited also at the public meetings. Few comments were received and those that were received were evenly divided between those supportive of the south arterial and those opposed to the facility. Two letters were received from public agencies voicing specific objections. A letter from the Great Falls Park and Recreation Department registered objection to any alignment requiring taking of designated parkland. A letter from the Great Falls Public Schools registered objection to impacting a designated school site within the project corridor.

Additional comments were received following circulation of a questionnaire designed to establish socioeconomic characteristics of the potentially impacted area. The questionnaire in addition to requesting demographic information, requested comments in general concerning the south arterial project.

On January 8, 1980 a resolution objecting to the proposed South Arterial was received containing a total of 87 signatures of residents of the Southwest Great Falls area. The resolution states that their opposition is based on concern for the destruction of personal property, relocation of directly affected residents, reduction of property values, increased noise pollution, increased air pollution, safety of residents, inadequacy of feeder roads to handle existing traffic, disruption of their privacy and lifestyle, mental anguish, and concern for wildlife and for the natural scenic beauty of the area. The resolution offers as alternative suggestions, the improvement of 10th Avenue South to handle increased traffic, or the utilization of the existing north bypass.

PUBLIC HEARING AND COMMENTS

A public hearing following circulation of this draft EIS will be held to afford individuals and public and private agencies an opportunity to comment on the content of the EIS. At this time a recapitulation of the important findings of the planning study and the significant impacts identified in the Draft EIS will be given. Written and oral testimony will be received regarding the Draft EIS. The date and location of the public hearing will be advertised in the local news media in Great Falls.

Written comments submitted prior to or following the public hearing should be sent to:

Mr. Steven Kologi, Chief
Preconstruction Bureau
Montana Department of Highways
Helena, Montana 59601

Comments on the Draft EIS are due by April 18, 1980.

CHAPTER 6 - LIST OF PREPARERS

CHAPTER 6 - LIST OF PREPARERS

This planning study/EIS was developed using an inter-disciplinary approach to insure the integrated consideration of environmental, social, economic, and technical factors which may be affected by the alternatives. Due to the magnitude of this project consultants were retained to expedite the study.

The prime consultant is HKM Associates - Architects, Engineers, and Planners, located in Billings, Montana. HKM Associates is a full service, multi-disciplinary firm with expertise in such areas as transportation, utilities, structures, soils and geology, hydrology and hydraulics, and environmental planning.

HKM Associates retained the services of several other consulting firms to provide support expertise in various segments of the impact assessment. Brown and Caldwell, a multi-disciplinary consulting firm located in Seattle, Washington, conducted the assessment of resource impacts, personal impacts, social impacts, air quality impacts, and secondary impacts. Towne, Richards & Chaudiere, Inc., an acoustical consulting firm located in Seattle, Washington, performed the noise impact assessment. Historical Research Associates, a consulting firm located in Missoula, Montana, performed the historical site impact analysis and part of the archeological site assessment.

The Montana Department of Highways retained the services of Anthro-Research, Incorporated, located in Livingston, Montana, to perform the preliminary cultural resource reconaissance survey. Various Department of Highways divisions provided traffic projections and right-of-way, relocation, and utility move estimates.

To insure proper coordination and study development, a project steering committee was formed to review project planning and environmental assessment efforts.

A listing of the principal individuals involved in preparation of this statement and their primary expertise or qualifications follows. The project steering committee members are also listed including the agency they represent.

FEDERAL HIGHWAY ADMINISTRATION

- William Dunbar, P.E., Environmenal and Design Engineer
- Merlin Voegele, Right-of-Way Officer
- H.J. Olilla, P.E., Environmental Engineer

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Gary McLean, Archeologist

ANTHRO-RESEARCH, INCORPORATED

Larry Lahrens, PhD, Archeologist

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William Dunbar, FHWA
L.W. Fasbender, Cascade County Commissioner
Louis Fontana, Cascade County Surveyor's Office
R.W. Freeman, Montana Department of Highways
Gordon Larson, Montana Department of Highways
John Mooney, Director, Great Falls City-County Planning Board
Ben Rangel, Transportation Planner, Great Falls City-County Planning Board
Merlin Voegele, FHWA

APPENDICES

APPENDIX A

Bibliography of Planning Study/EIS Reports

Brown and Caldwell, November 1979, Great Falls, Montana, Proposed South Arterial M5212 (1), Environmental Impact Analyses - Resources Impacts, Personal Impacts, Social Impacts, Air Quality Impacts, Secondary Impacts, Seattle, Washington

Historical Research Associates, August 1979, Historic Resources Project, Great Falls South Arterial M5212 (1), Missoula, Montana

Historical Research Associates, October 1979, Cultural Resource Survey, Great Falls South Arterial Project, Montana Department of Highways Project M5212 (1), Missoula, Montana

HKM Associates, February 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 1, Summary of Existing Engineering Data, Billings, Montana

HKM Associates, March 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 2, Summary of Existing Environmental and Socio-Economic Data, Billings, Montana

HKM Associates, April 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 3, Selection of Design Parameters and Alternate Routes, Billings, Montana

HKM Associates, August 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 4, Preliminary Design of Alternate Routes, Billings, Montana

HKM Associates, September 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 5, Access Analysis, Billings, Montana

HKM Associates, October 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 6, Surface Drainage Study, Billings, Montana

HKM Associates, October 1979, Great Falls South Arterial M5212 (1), Technical Report on Task 7, Conflicting Areas Between the Great Falls South Arterial and Public Service Utilities, Billings, Montana

HKM Associates, January 1980, Great Falls South Arterial M5212 (1), Technical Report on Task 8, Stage Construction Report, Billings, Montana

HKM Associates, January 1980, Great Falls South Arterial M5212 (1), Report on Task 13, Public Involvement, Billings, Montana

Montana Department of Highways, November 1979, Project M5212 (1), Designation: Great Falls South Arterial, State 1, Conceptual Stage (Recloation Estimate), Great Falls, Montana

Montana Department of Highways, November 1979, Right-of-Way Estimate, Project No.: M5212 (1), Designation: Great Falls South Arterial, Great Falls, Montana

Towne, Richards & Chaudiere, Inc., December 1979, Supplemental Report, Noise Impact Analysis, Great Falls South Arterial, Seattle, Washington

The above bibliography lists the detailed technical reports and environmental impact analysis reports prepared in conjunction with the EIS/planning study. This Draft Environmental Impact Statement summarizes the information and findings presented in these reports. Copies of these reports are on file for public review at the following locations:

U.S. Department of Transportation
Federal Highway Administration
Federal Office Building
301 South Park Street
Helena, Montana

Montana Department of Highways
Preconstruction Bureau
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Helena, Montana

Montana Department of Highways
Division Office
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Great Falls, Montana

Great Falls City-County Planning Board
Civic Center
Great Falls, Montana

HKM Associates
Airport Industrial Park
Billings, Montana

APPENDIX B

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